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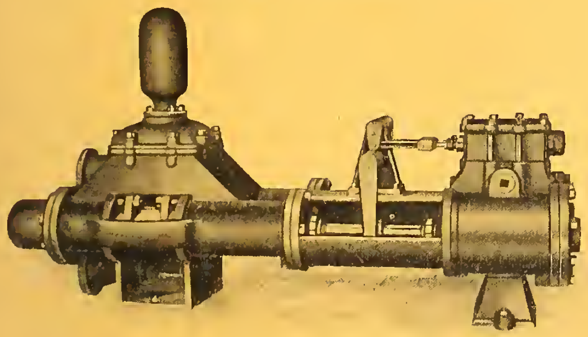
Vol. 26 Toronto, January 3, 1912 No. 1

ESTABLISHED 1886

Contract Record and Engineering Review

We manufacture
Steam and Power Pumps, Condensers,
Travelling Cranes, etc.



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The **Smart-Turner Machine Company**
HAMILTON, ONTARIO Limited

"MADE IN CANADA"

Bent Glass

Made in all Kinds of Glass on Short Notice

Large Bent Plate Glass for Shop Fronts a Specialty

The Toronto Plate Glass Importing Company, Limited
(HILL & RUTHERFORD, Managing Directors)
Head Office and Works: 91 to 133 Don Roadway
TORONTO

Gives a Bright Appearance

"Queen's J L B L Head"
CANADA

Galvanized Iron

One Contractor says: "It is a pleasure to look at "QUEEN'S HEAD" work

John Lysaght, Limited
Makers
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MONTREAL
Managers, Canadian Branch

Continuous and Machine Banded Wood Stave

WATER PIPE

RESERVOIR TANKS

for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe— and better.

Pacific Coast Pipe Co., Limited
P. O. Box 563 Vancouver, B. C.
Office and Factory, Granville St., near High Bridge
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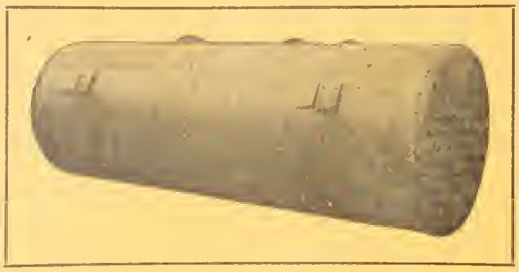
Full Particulars and Estimates Furnished

Alphabetical Index of Advertisers, Page 16 Classified Directory to Advertisements, Page 6



Steel Boilers

for Heating Public Buildings, Schools, Factories, etc.

Built in all sizes and good for a low or high working pressure.

We design a Special Constructed Boiler built to Rigid Specifications and accepted by Architects for heating purposes.

Ask for Catalog

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General Offices: Sherbrooke, Que.

Works: Sherbrooke, Que. St. Catharines, Ont.

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The Largest and Most Expensive Reservoir in the World

The Ashckan Dam and Dikes near Brown sta. N. Y.

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90 "AMERICAN" Engines
80 "AMERICAN" Derricks
1 "AMERICAN Locomotive Crane

Used in the construction of this great project.

¶ Send coupon for information and prices on "AMERICAN" ENGINES, DERRICKS, MATERIAL ELEVATORS, HORSE POWERS, CRABS, ETC.

American Hoist & Derrick Co.

ST. PAUL, MINN.

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AMERICAN HOIST & DERRICK CO. ST. PAUL, MINN. Please send prices and information on 'AMERICAN' *(state what you are interested in)*

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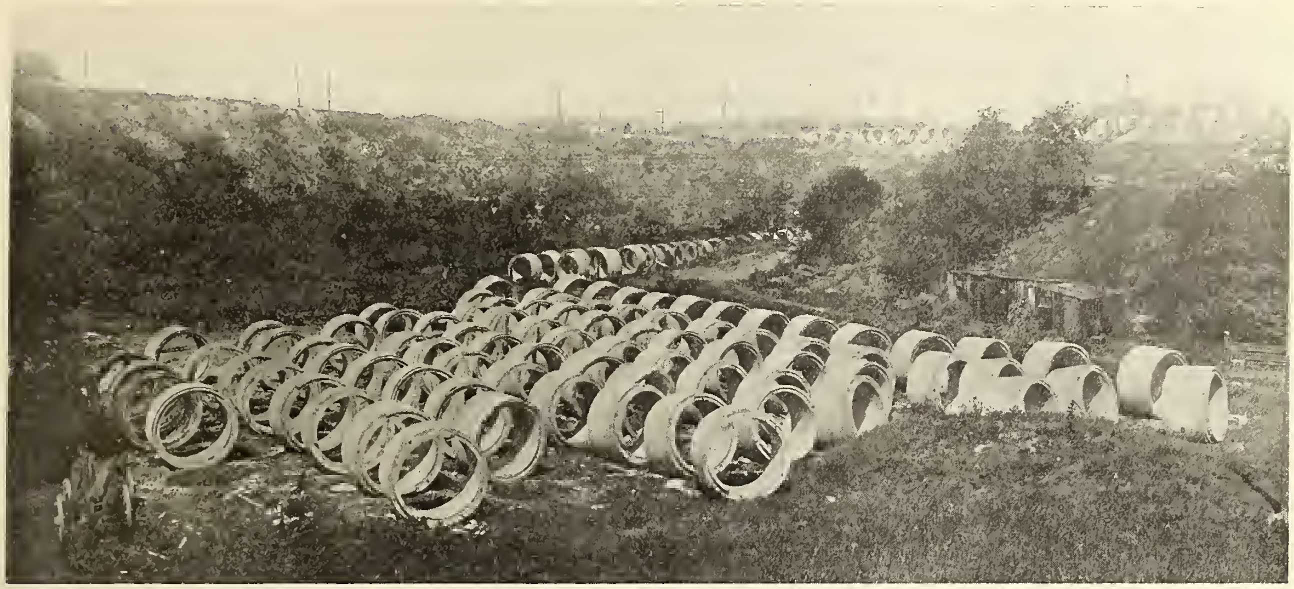

REINFORCED CONCRETE SEWER PIPE. VIEWED FROM C. P. R. TRACK, HAMILTON

If It Passes Our Tests, It Will Meet Your Needs

There is no longer any question about the suitability of concrete for the making of sewer pipes, drains or any work that has to withstand the corrosive effects of acids or the damages inflicted by frost and water.

Reinforced concrete, **properly made,** has been successful in the most rigid tests and is now the recognized material for all important work.

Properly made concrete, means, not only thoroughly mixed and the right proportions of cement, aggregate and sand—it also means that the cement used, be of the highest standard of purity.

The pipes shown here were made in Hamilton, Ont., by the REINFORCED CONCRETE PIPE CO. of JACKSON, MICH. They have made pipes for some of the most important work done, both in the United States and Canada and they now use "Canada" Cement exclusively.

THE REINFORCED CONCRETE PIPE CO., report that although they have, on one piece of work, used cement from no less than five of our mills, they could see no difference in the quality of the cement or in the work produced. That is what the "Canada" Brand stands for:—absolute purity and absolute uniformity.

Canada Cement Co., Limited

MONTREAL - TORONTO - WINNIPEG - CALGARY

The Enormous Capacities

of the

Symons Disc Crushers

have never been equalled

They can produce from 40 Tons of ¼ inch to 1,000 Tons of 2½ inch per 10-hour day. They are in a class by themselves and will well repay your investigation. Manganese equipped, strong, durable and economical.

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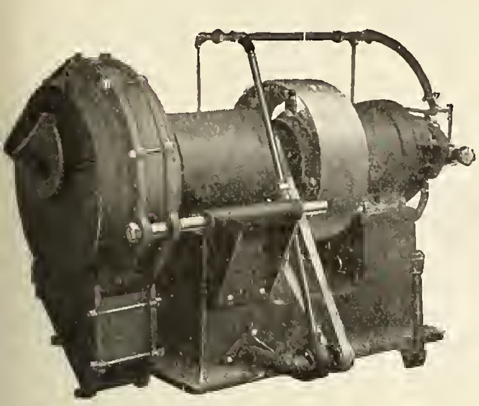
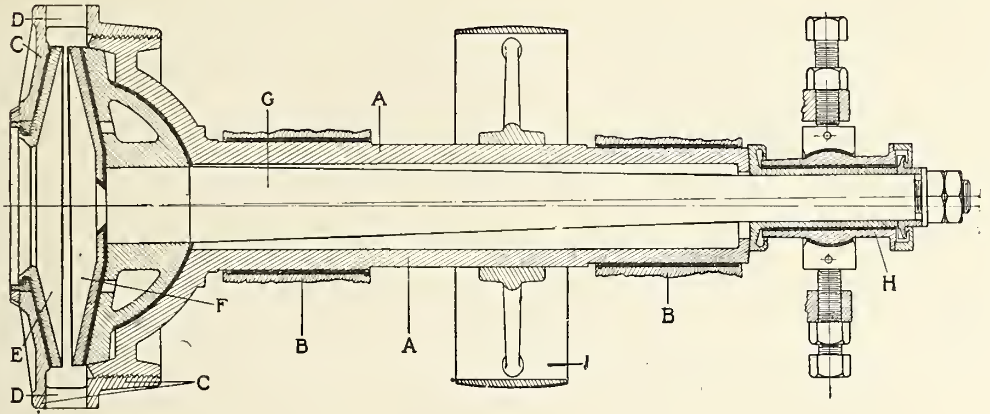


The

Symons Disc Crusher

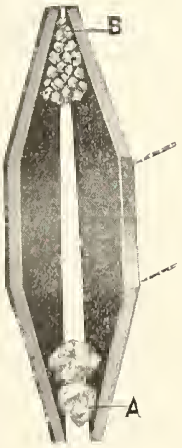


SECTIONAL VIEW

The

Manganese Discs

which do the work



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Winnipeg, 259-261 Stanley St.
Calgary, Samis Block
Vancouver, 365 Water Street

CLASSIFIED INDEX TO ADVERTISEMENTS

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Architects
Keefer, Allan
Weeks, Arthur L.

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Canada Wire & Iron Goods Co.
Dennis Wire & Iron Works
Meadows Co., Geo. B.

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Northwestern Terra-Cotta Co.
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Escher Wyss & Co.

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Mussens Limited
Ontario Wind Eng. & Pump Co.
Smart-Turner Machine Co.
Waterous Engine Works Co.

(Continued on page 10)

DON VALLEY BRICKS

Residence of Mr. J. C. Eaton, Toronto. **Messrs. Wickson & Gregg, Architects**

Don Valley Porous Terra Cotta Fire Proofing, Foundation Bricks, Facing Bricks and Enameled Bricks Exclusively Were Used in This Structure

¶ These bricks have been the unanimous choice of discriminating architects and owners in competition with samples submitted by the leading brick firms of Canada and the United States. They are the only thoroughly vitrified facing bricks ever manufactured in the Dominion, and the most exclusive high-class pressed brick on the American continent.

¶ The above view is an illustration of one of the many important buildings in which this product is used.

THE DON VALLEY BRICK WORKS

Head Office: 36 Toronto St., TORONTO

Montreal Agent: **David McGill, 83 Bleury Street**

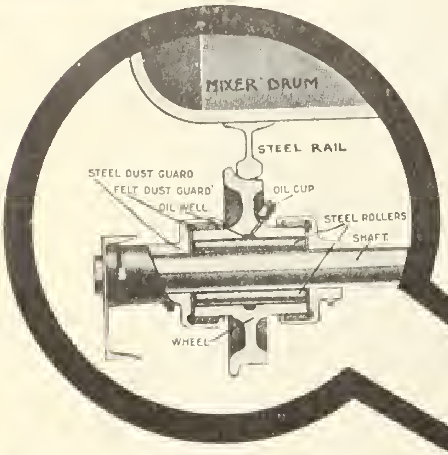
Study the Details

most mixing least fixing

Get right down to brass tacks on the Mixer Proposition and you will learn why we are justified in saying that

The M-C Line is the Best

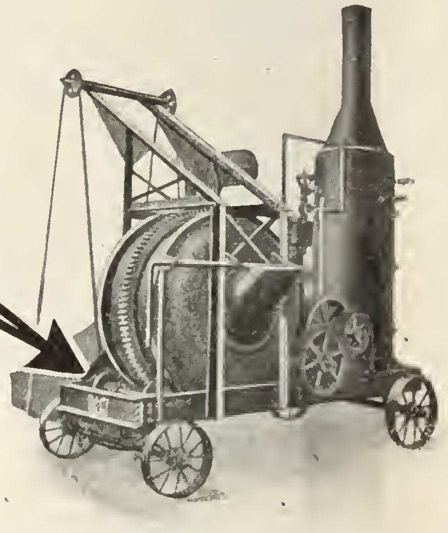
it does make a big difference to You



Note the **two** trunnions each made of **one** piece of **solid steel railroad rail.** They can never wear out, never break through the drum and never cause scalloping.

Note the absolutely dust proof roller bearings and heavy, flanged car wheels. This detail means longer life, less power and **no** trouble.

Then there's the important feature of the **Gear Ring.** On the M-C Line it is cast in **five interchangeable** segments. This means a lot to the man who has had a gear tooth (or teeth) break in a rush job and the mixer out of business. **With the M-C Line you simply remove one segment, bolt a new "fifth" in place and continue--practically no lost time.**



Again we say:—STUDY THE DETAILS

We have a catalog showing many more of the exclusive features of the M-C Line. Do you want it?

most mixing least fixing

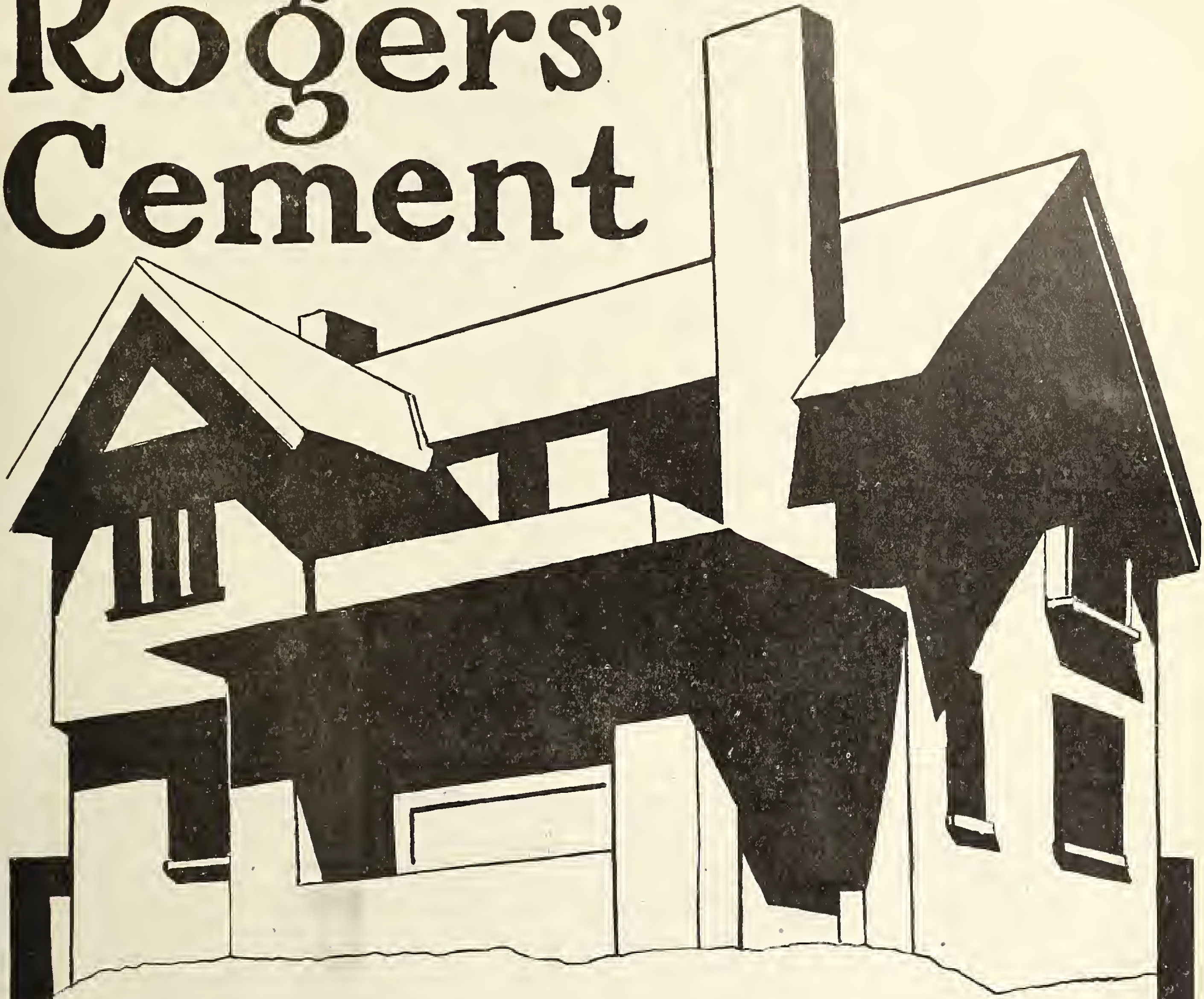
If so write **The Ford Iron Company**

MONTREAL Limited

Everything for Concrete Work Everything for Stone Work

Write any question or phone when in town, Main 7600

Rogers' Cement



THE Architectural Possibilities of Portland Cement Concrete are brought out to the full by the use of Rogers Brands, owing to *great strength* of set, *speed* of set, uniformity of color and *high binding capacity*, even with large bulk of aggregates. These qualities are secured by *rigid care* and *constant comparision* with a *standarized* Portland Cement, to procure *similarity* of action.

The house illustrated is a rough stone treatment originally, with beamed upper storeys. The appearance of this type of structure in cement concrete illustrates its capacity for making beautiful house architecture possible by accentuating the lines of the structure, accentuating proportion, and giving a sense of simple strength, stability and dignity. From rigid suppression of ornamental detail, Portland Cement Concrete can go to the extreme opposite of being the medium for profuse ornamentation, as the most adaptable and flexible constructive material ever known. Get Concrete's possibilities to the full by using it on house construction.

Service is a feature of the Rogers organization by which all constructive operations dependent upon *deliveries* are facilitated to the highest degree that the *architect* and *contractor* may both derive the fullest benefit and profit from specifying *Rogers* Brands.

Our Mills are located at Atwood, Durham, Hanover, Kirkfield, Orangeville, Owen Sound and Wiarton.

Alfred Rogers Ltd., 28 West King St., Toronto

W. C. Huff, Western Travelling Representative, Winnipeg.

3

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Parker, S. E.

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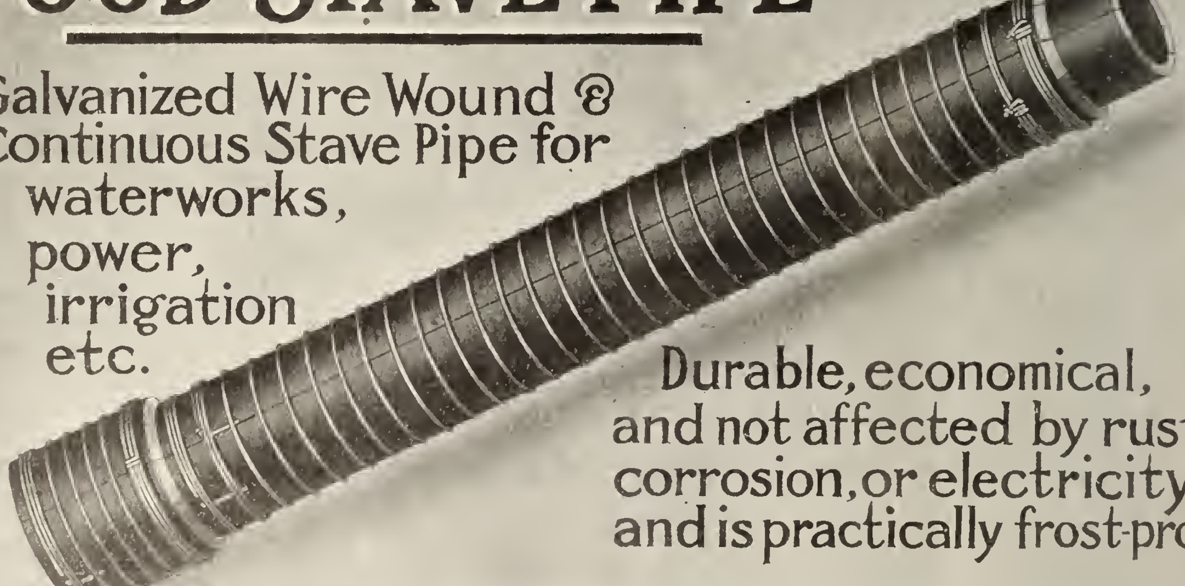

WOOD STAVE PIPE

Galvanized Wire Wound &
Continuous Stave Pipe for
waterworks,
power,
irrigation
etc.

Durable, economical,
and not affected by rust,
corrosion, or electricity,
and is practically frost-proof.

Prompt attention to all enquiries. Write for Catalogue.

The Dominion Wood Pipe Company, Limited
New Westminster, B.C.

Lead Wool

For Jointing
(of Gas and Water Mains)

MEANS GREATER EFFICIENCY
AT LESS COST

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and Particulars

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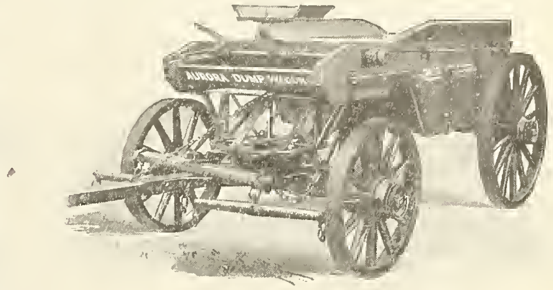
51 Victoria Square
MONTREAL
Sole Agents in Canada for:
The Lead Wool Company, Limited

THE STRENGTH OF OAK WITH
40 PER CENT SAVING IN WEIGHT

That's the saving effected by constructing the bed of selected Washington Fir, and its just one of the many reasons why lightest weight is combined with greatest strength in the



"Aurora" Dump Waggon

Built low for easy loading, coupled short for lightest draft only 7 feet 4 inch wheel base.

Chains entirely outside of bed, direct pull of chain on doors and length of chains adjustable.

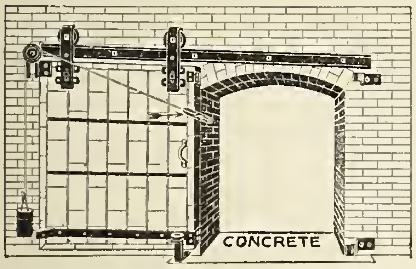
Slotted hinges on doors give vertical movement, preventing installing team on dump.

Study its sturdy construction—its mechanical, labor-saving and dependable qualities. Catalog for the asking.

Western Wheeled Scraper Co.
AURORA, ILL.

ON THE HANGERS AND THE FUSIBLE LINK DEPENDS YOUR FIRE DOORS CLOSING AUTOMATICALLY

If the Fusible Link fuses (as it will) but the door has sagged and will not close, it is no fire stop. Our **Adjustable Hangers** overcome such a condition. It is such an easy matter for anyone to adjust them anyway, that they are always running easy and free. With the old fashioned hanger it takes a mechanic sometime to adjust a sagging door and it is usually not attended to when a fire comes.



SPECIFY THE "ORMSBY UNDERWRITERS" DOORS
You will get the Best at a Nominal Figure.

A. B. ORMSBY, Limited
Experts in Fireproof Windows and Doors
Factories
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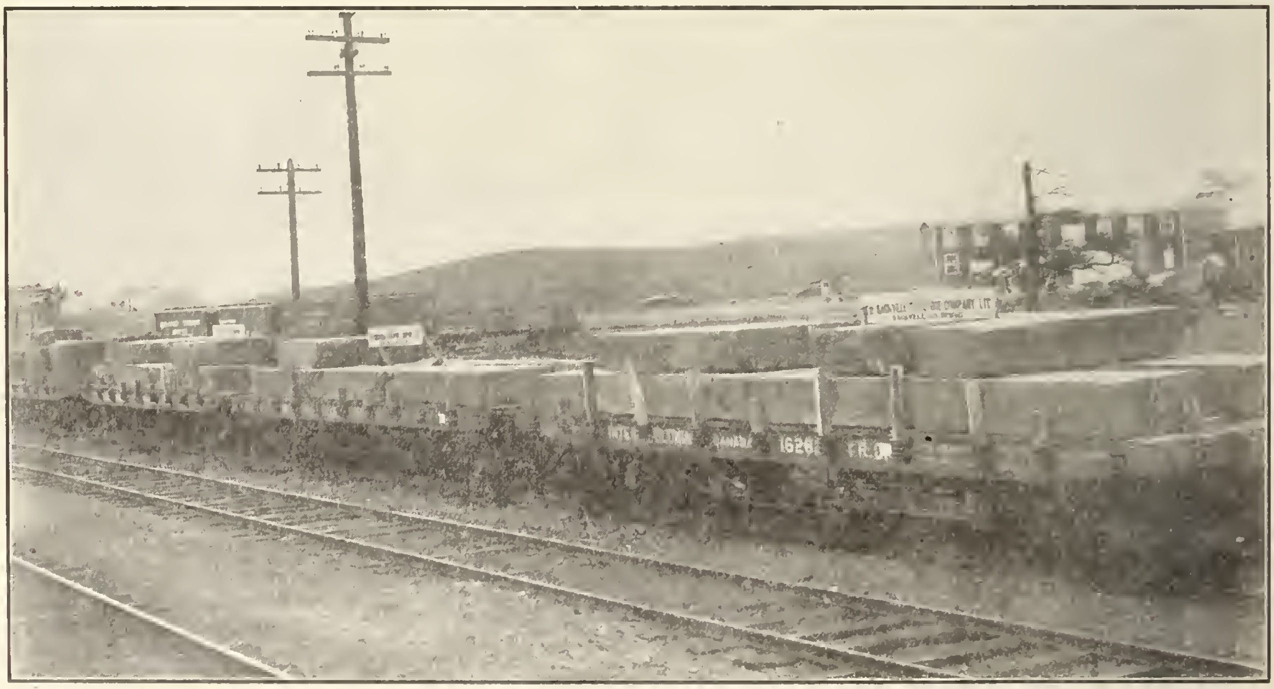

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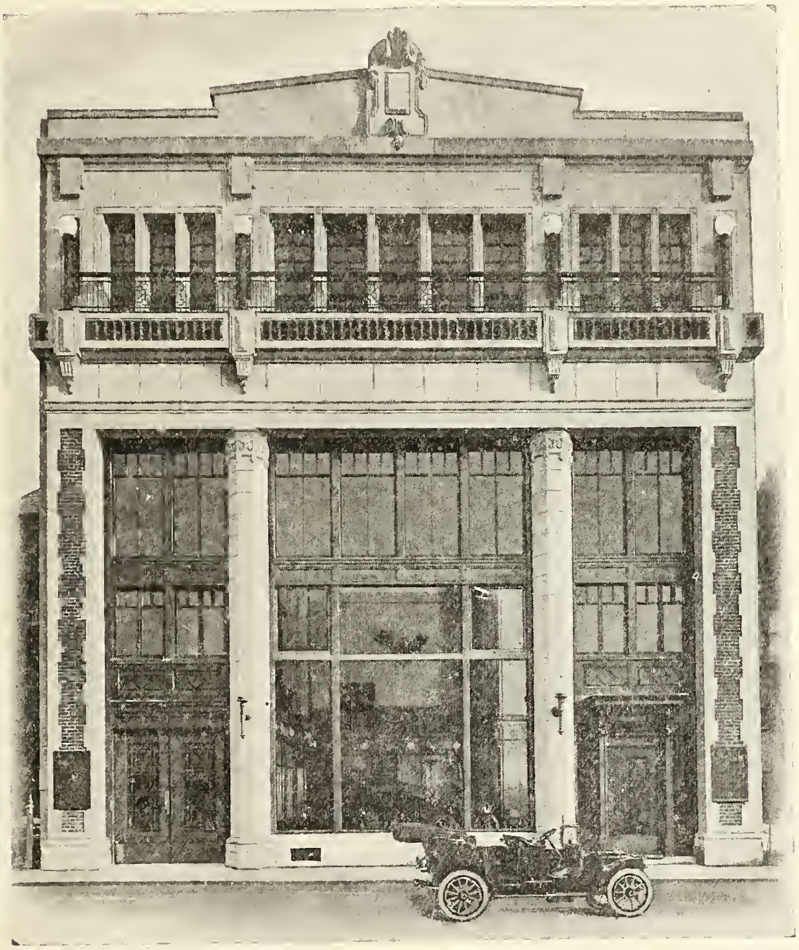

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Abenaque Machine Works 76

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Bell Filtration Co. of Canada, Ltd. 31
Browning Engineering Co.
Brodie & Company, James
Brennen & Sons Mfg. Co., Ltd., M. 101
Bates & Edmonds Motor Co. 94
Bennett, Robert
Business Systems Limited 75
Beatty & Sons Limited, M. 79
Bryan Manufacturing Co.
Beckmann Co., L. 83
Brown Hoisting Machinery Co. 85
Britnell & Co., Ltd. 86
Bremner Limited, Alex. 91
Bain & Ross 92
Bowman & Connor 92
Blystine Manufacturing Company
Batts Limited

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Cook, A. D. 80
Consolidated Stone Co. 80
Crushed Stone Limited 75
Consolidated Optical Co., Ltd. 82
Contractors' Supply Co., Ltd. 86
Christie Henderson & Co. 86
Crescent Wire & Iron Works 87
Commercial, The 87
Canadian Bridge Co., Ltd. 88
Cleveland Bridge & Engineering Co., Ltd. 88
Canadian Pipe Co., Ltd. 90
Canada Iron Corporation Limited 91
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Dahlstrom Metallic Door Co. 23

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Eastern Pipe & Construction Co., Ltd. 95
East Iron & Machine Co. 78
Eaton & Sons, Ltd., J. R. 84
Erie Machine Shops 76

Ford Iron Company, Limited 8
Federal Engineering & Supplies Limited 72
Factory Products Limited 35
Ferguson, H. S. 92
Farmer, John T. 92
Fuce, Edward O. 92
Foundation Company

Goodyear Tire & Rubber Co. of Canada, Ltd. 33
Georgian Bay Shook Mills Ltd.
Greening Wire Co., Ltd., B. 95
Galt Art Metal Co., Limited 80
Gibb, Alexander 21
General Machinery Co., Ltd.
Gurley, W. & L. E. 82
Gartshore-Thompson Pipe & Foundry Co., Ltd. 90
Galt Engineering Co., John 92
Gartshore, John J. 92
Guarantee Company of North America 92

Hagerville Contracting Co., Ltd. 11
Hamilton Pressed Brick Co.
Hamilton Machinery Co., Ltd. 26
Hobbs Manufacturing Co., Ltd. 76
Holmes & Sons, Fred
Harvey, J. 87
Hunter Bridge & Boiler Co., Ltd. 89
H. & E. Lifting Jack Co.
Hancock, Jr., H. Syd. 92
Hunt & Company, Robert W. 92
Hopkins & Company, F. H. 104
Heinicke Inc., H. R.
Hepburn, John T. 17

International Marine Signal Co., Ltd. 14
Inglis Company, John 69
Imperial Wire & Cable Co., Ltd. 103

Jenckes Machine Company, Ltd. 2
Johnston & Chapman Company
Jamieson Lime Company 81
Johnston, A. H. 76

Kennedy, James C. 92
Keefer, Allan 92
Kerr Engine Co., Ltd. 34

Leslie & Co., Ltd., A. C. 1
London Concrete Machinery Co, Ltd. 13
Luxfer Prism Company 101
London Gas Power Co., Ltd. 73
Leonard & Sons, E. 75
Leach Concrete Co.
Laurentian Granite Co., Ltd. 87
Lea, R. S. 92

Mussens Limited 4
Munderloh & Co., Ltd. 11
McCoy Company, Henry J. 32
Mitchell Company, Ltd., Robert 32
Meadows, George B. 35
Milton Pressed Brick Company 36
MacLean Daily Reports 81
McDougall Caledonian Iron Wks. Co., John 71
Marsh & Henthorn Limited 73
Metallic Roofing Co., Ltd. 73
MacKinnon Holmes & Co., Ltd.
Myers, Oakley 75
Montreal Locomotive Works, Ltd. 75
McMillan & Son, W. N.
Missisquoi Marble Co., Ltd. 84
Miller & Co., George M.
McNally & Co., William 89
Metal Shingle & Siding Co.
Mace, T. Harry 92
Moore & Scollan 92
Mitchell, Chas. H. & Percival H. 92
McIlwraith, James A. 92
Morrison & Co., T. A. 92

Neptune Meter Co. 25
Noble, Clarence W. 78
North Company, Ebenezer 83
Northwestern Terra Cotta Company 85
National Bridge Co., of Canada, Ltd. 89
National Iron Works Ltd. 91

Ormsby, Ltd., A. E. 11
Ontario Sewer Pipe Co., Ltd. 20
Ontario Wind Engine & Pump Co., Ltd. 75
Ontario Lime Association Limited 77
Ontario Asphalt Block Co., Limited 78
Owen Bucket Co. 76

Pacific Coast Pipe Co., Ltd. 1
Pyle-National Electric Headlight Co. 9
Parker, S. E. 27
Page Wire Fence Co., Ltd. 88
"Prime White" Road Oil Co. 93
Power & Son
Pedlar People Limited
Phoenix Bridge & Iron Works, Limited 89
Port Credit Brick Co., Ltd. 90
Patterson Mfg. Co. 102

Queenstown Quarry Co., Ltd. 91

Rogers Limited, Alfred 9
Roman Stone Co., Limited 15
"R. I. W." Damp Resisting Paint Co. 19
Rogers Supply Company 27
Rhodes, Curry Company Limited 73
Reid & Brown 92
Rouleau, Jos. N. 92

Smart-Turner Machine Co., Ltd. 1
Sackville Freestone Co., Ltd. 14
Standard Drain Pipe Co., Ltd. 21
Steel Company of Canada 30
Steel & Radiation, Ltd. 28
Standard Ideal Co., Ltd. 36
Shawmut Vitrified Paving Brick Works
Sturtevant, B. F. 98
Steward, A. P. 74
Smyth & Ryan 86
Sand & Supplies, Ltd 89
Sarnia Bridge Co., Ltd. 89
Smith Limited, Thos. & Wm.
Toronto Plate Glass Importing Co., Ltd. 1-85
Toronto Furnace & Crematory Co.
Turner, C. A. P. 100
Taylor, J. & J. 98
Thew Automatic Shovel Co., The 74
Tide Water Iron Works 77
Troy Wagon Works Co. 84
Thompson & Co., B. & S. H. 85
Taylor, Hogle & Davis

Union Water Meter Co. 25
Universal Crusher Co. 79

Vulcan Iron Works 84
Vining Manufacturing Co. 74

Wettlaufer Bros. 12
Wells & Gray, Ltd.
Western Wheeled Scraper Co. 11
Woods Limited 25
Wilson Bros., Ltd. 94
Waterous Engine Works Co., Ltd. 77
Wadsworth Howland & Co., Inc. 79
Watson Wagon Co.
Wyss & Co., Escher
Western Canada Contractor 86
Weeks, Arthur L. 92
Whitetead & Co., Ltd., John 103

York Sand & Gravel Co. 86

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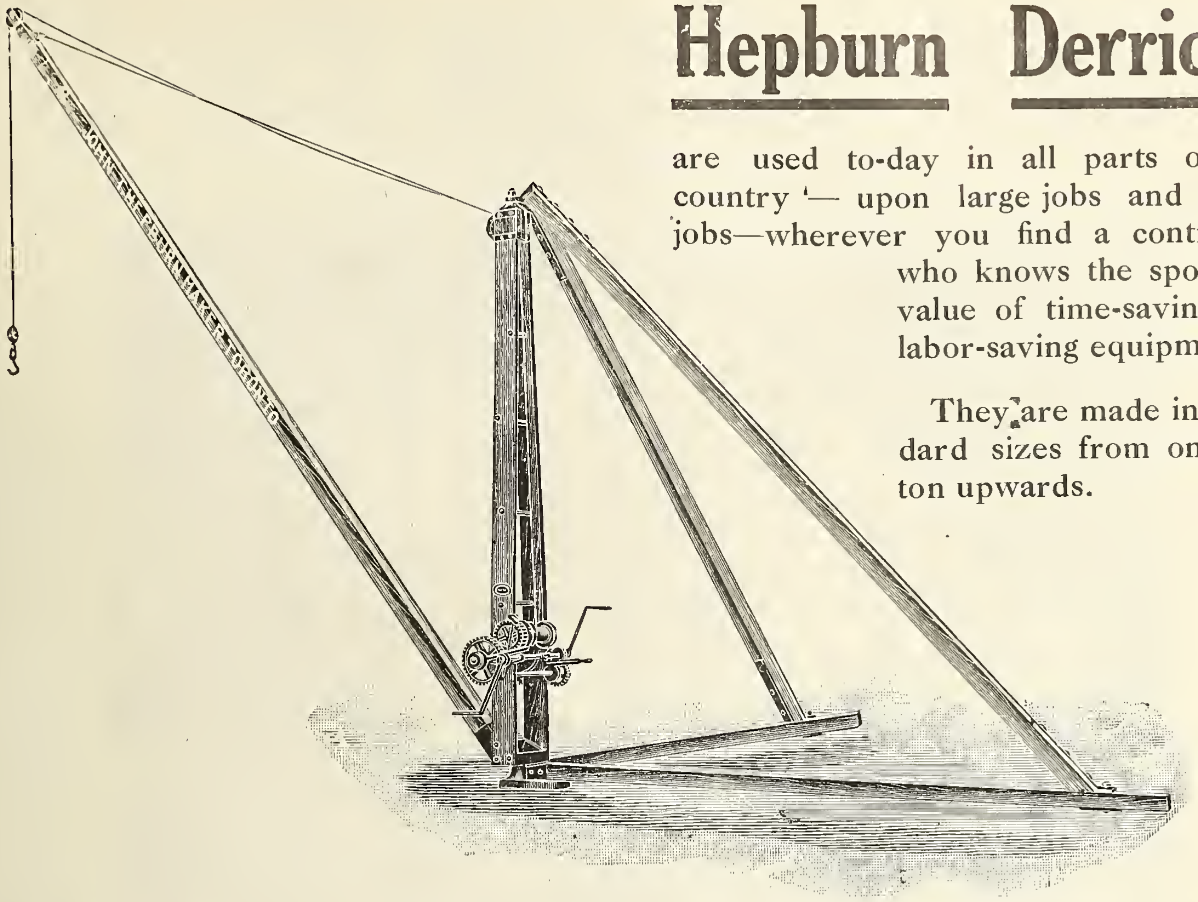
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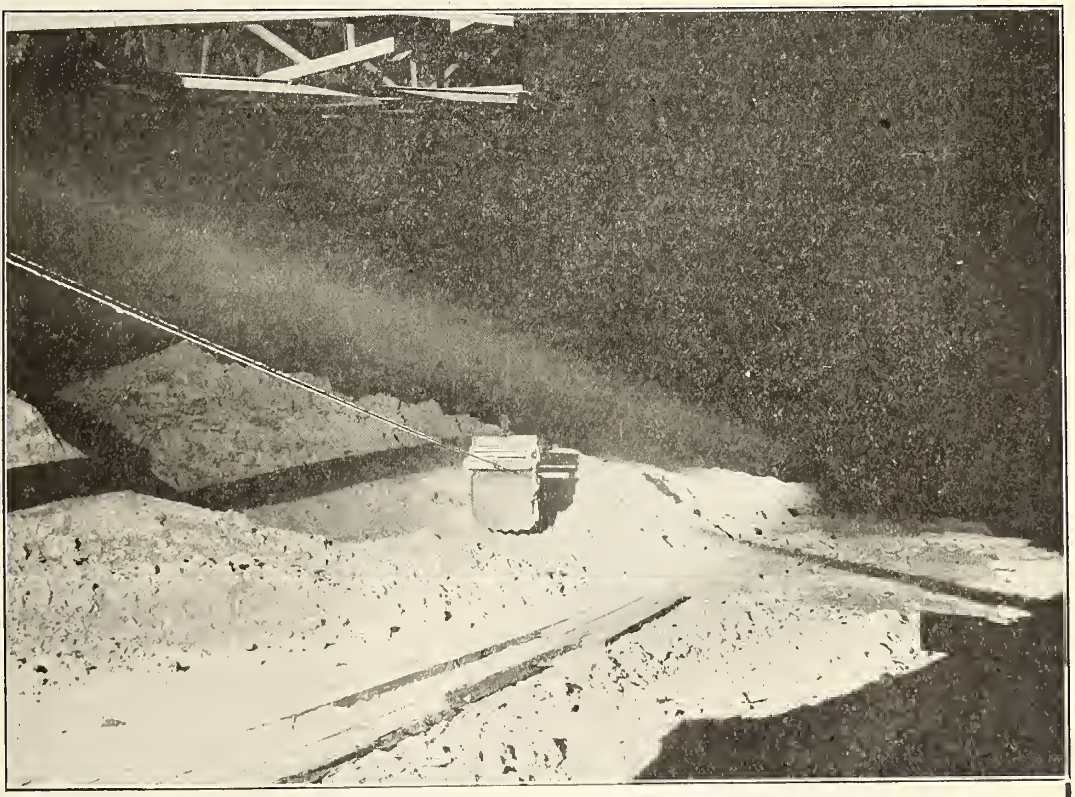

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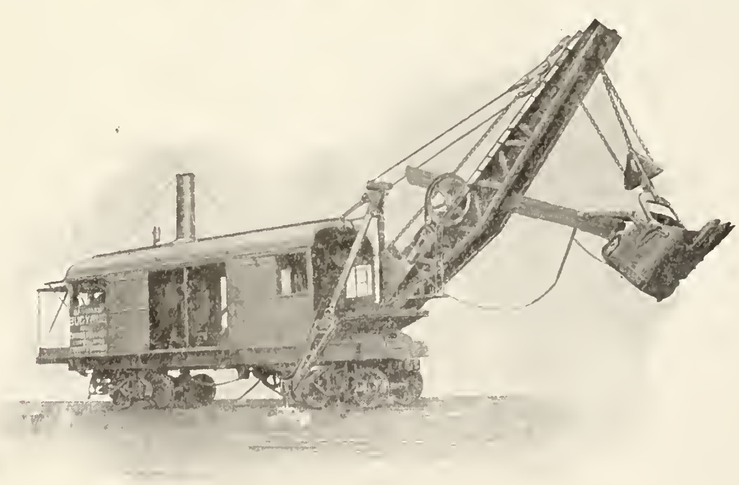

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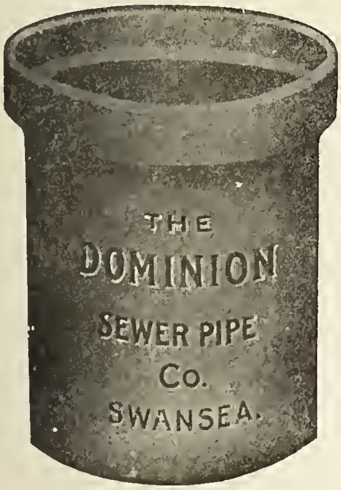

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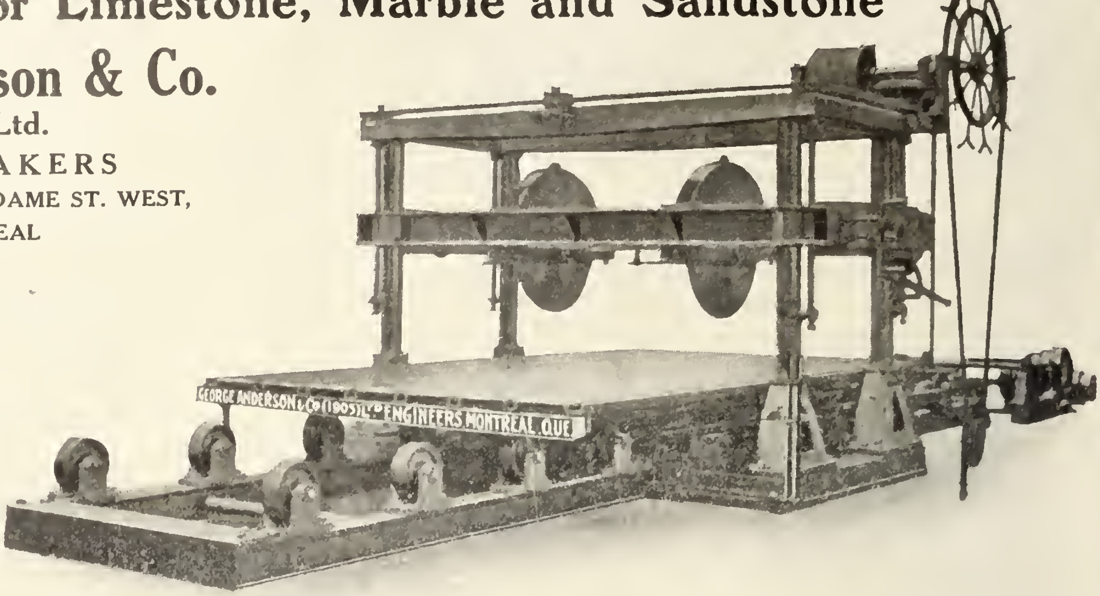

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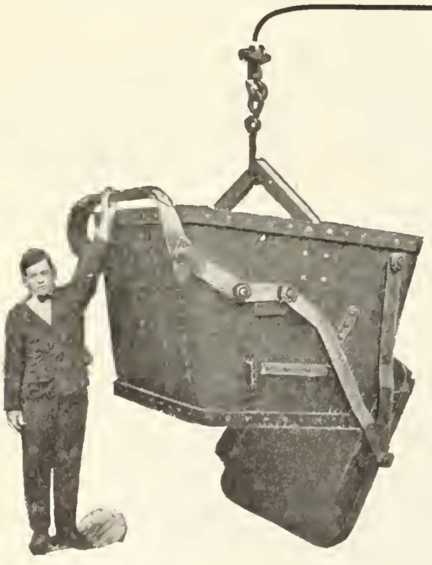

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"IF we are to better conditions, we must realize that 'fireproof' is not 'fireproof' as it is understood today. The literal definition remains, but many crimes have been committed in its name. . . . . There is but one principle to fireproof construction irrespective of the kind of structure. To have fireproof buildings, architects and owners must throw aside precedent and eliminate the use of combustible and semi-combustible materials in their construction.

" . . . . If there were still an absolute necessity for its use, if it could not be replaced with steel, as it has been in many modern constructions, it would then be well to attempt to conceive of something better. I am opposed to the use of wood in any form in fireproof buildings and the law ought not to permit its use.

" . . . . To me there is a fascination about steel interiors. It constantly emphasizes the absurdity of fire-fighting, for how can fires rage if they have nothing to feed upon?"

Interviewed, Ex-Fire Chief Croker said: "You are at perfect liberty to use my talk partially or entirely and apply it to your products. I have watched your development since you first originated cold drawn steel interiors with great interest. I have nothing more to say. My address, and the fact that my private residence will be equipped throughout with The Dahlstrom Products is as strong a recommendation as I can make."

Ex-Fire Chief Croker's address has been done in booklet form. Copies may be had for the asking. "Buildings As They Should Be" clearly describes the elimination of all combustible materials in buildings. A copy may be had for the asking. Send for it.

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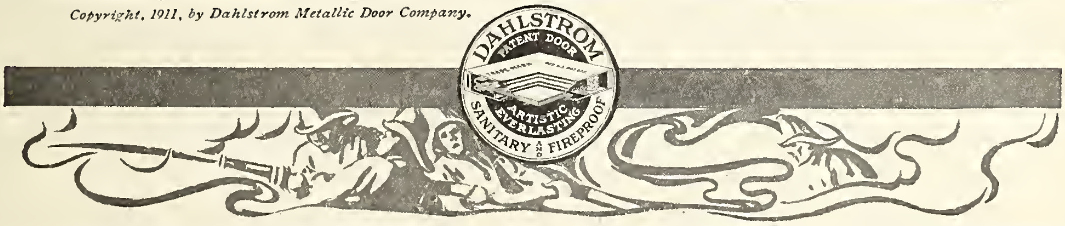

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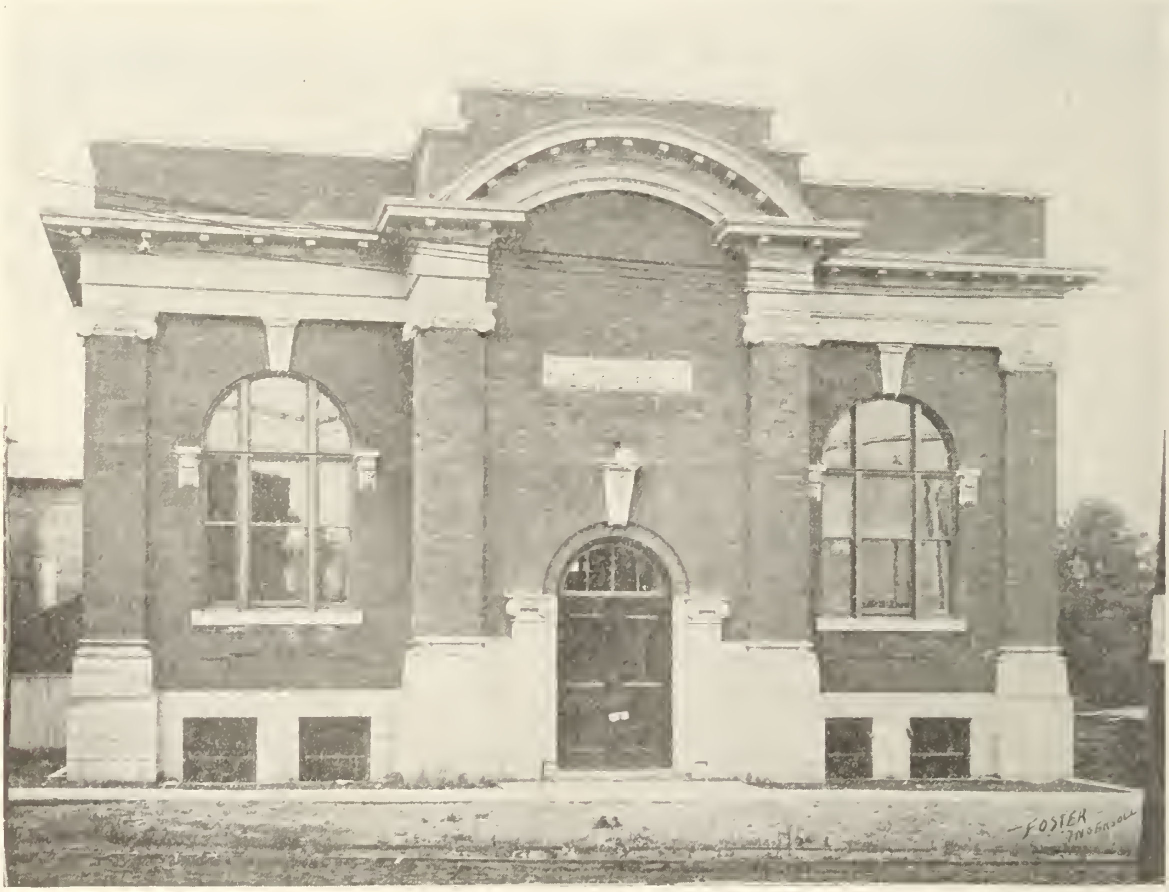

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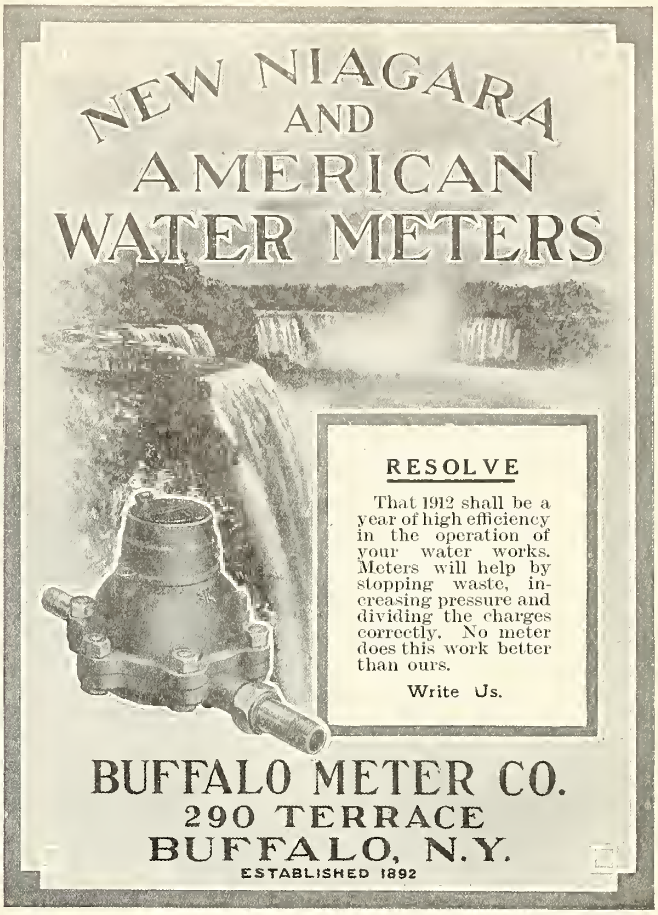

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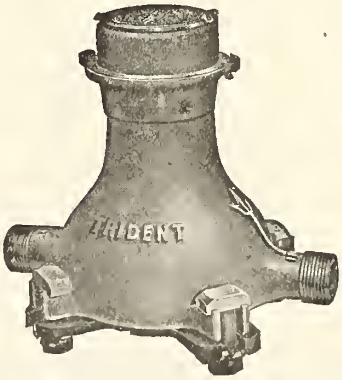

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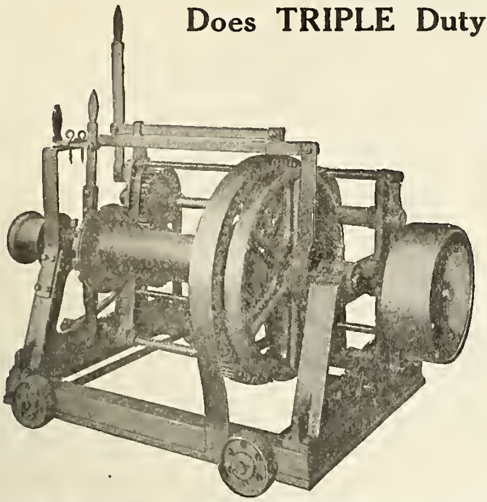

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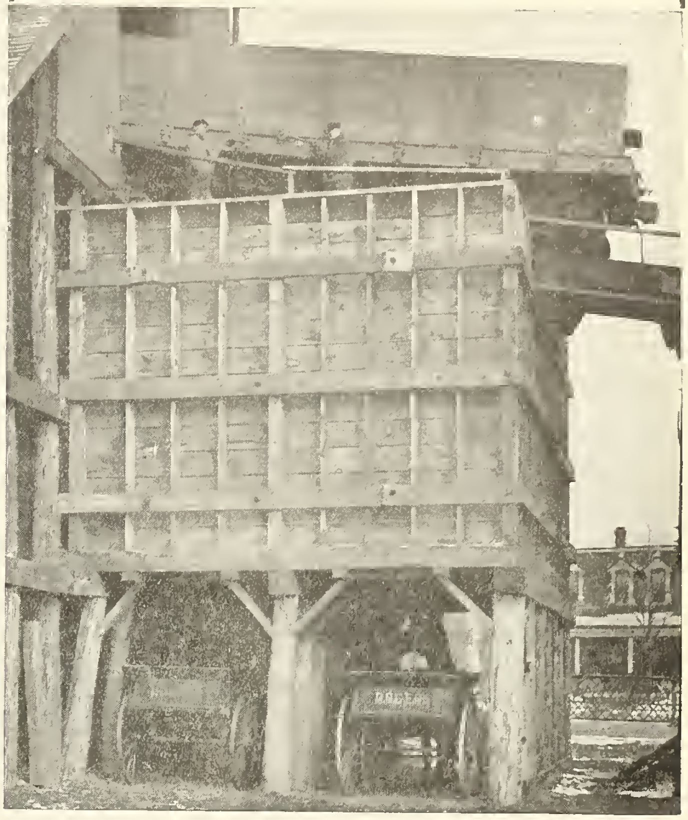

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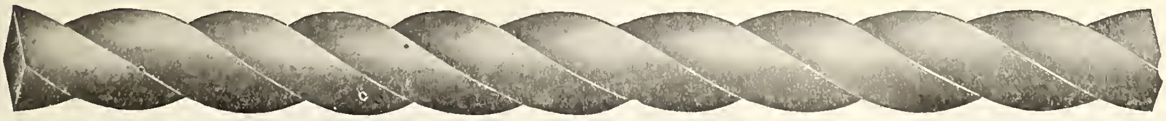

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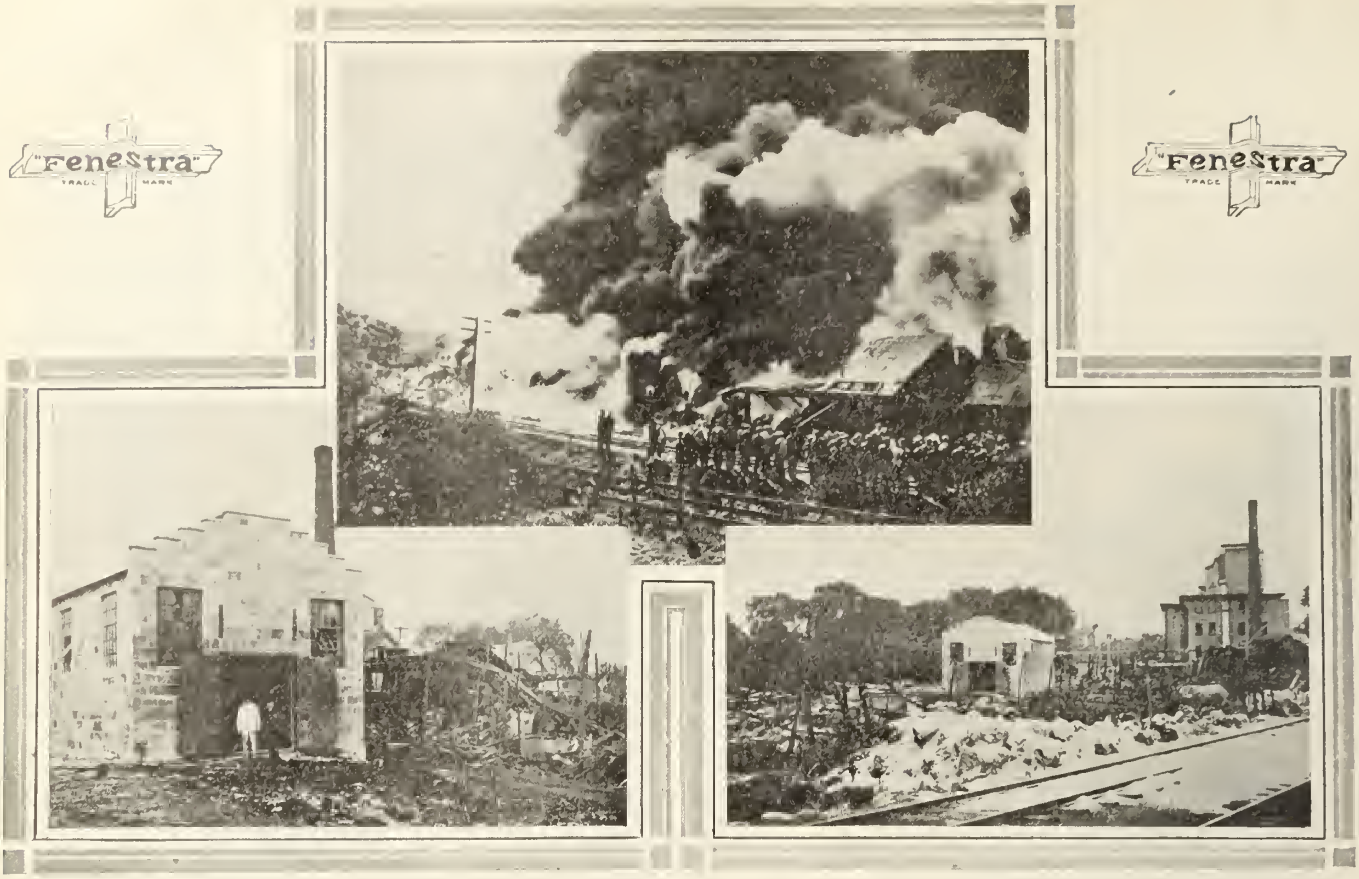

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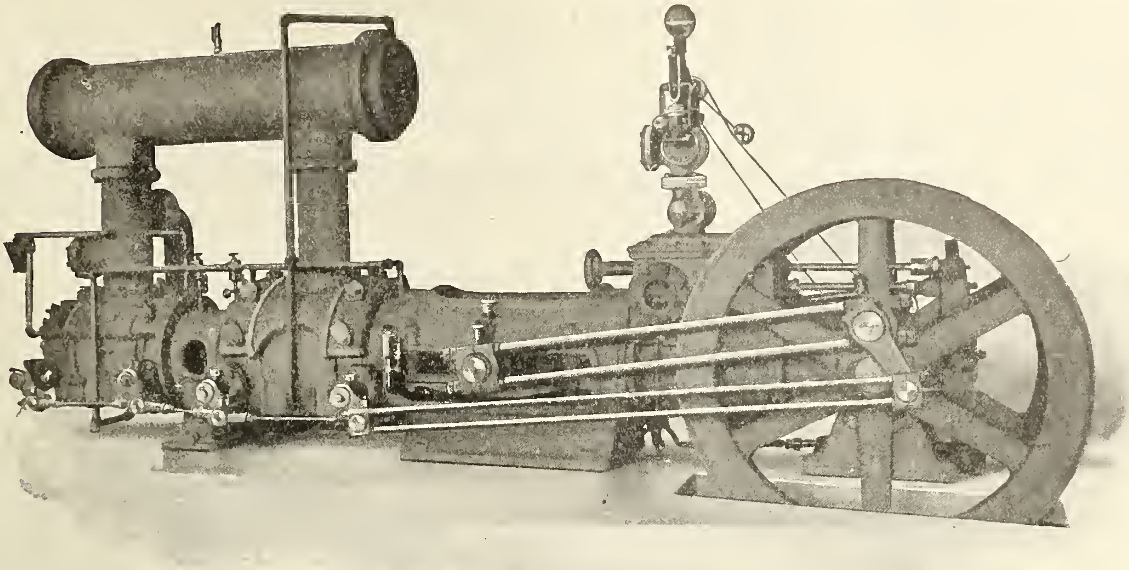

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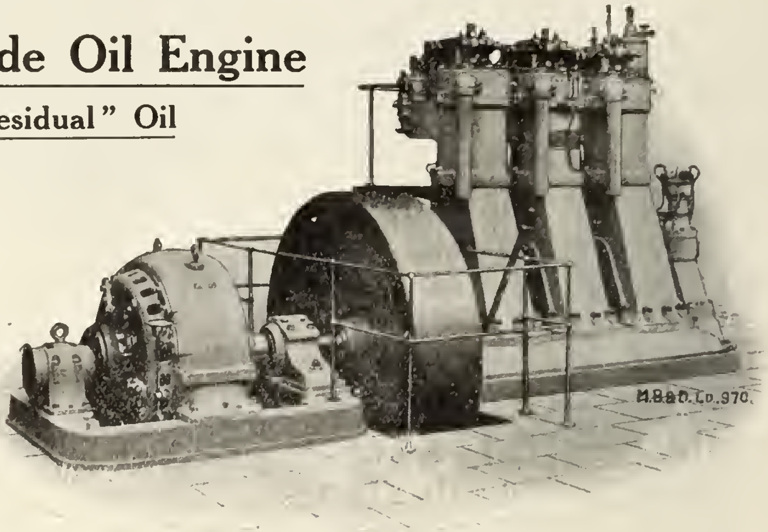

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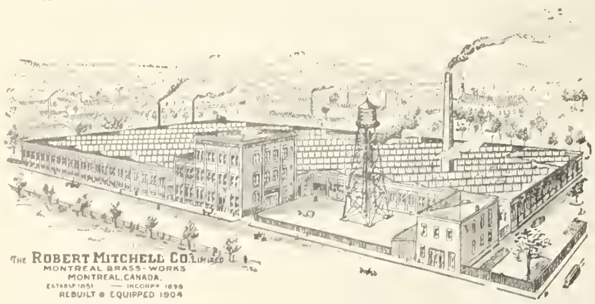

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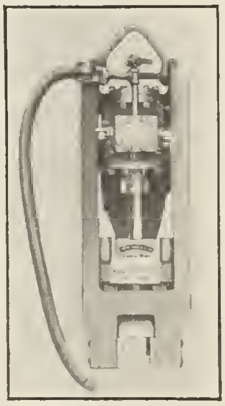

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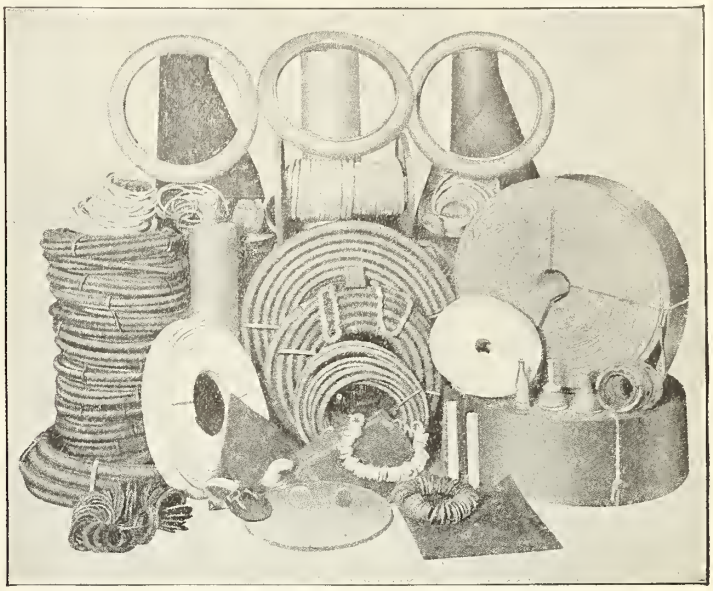

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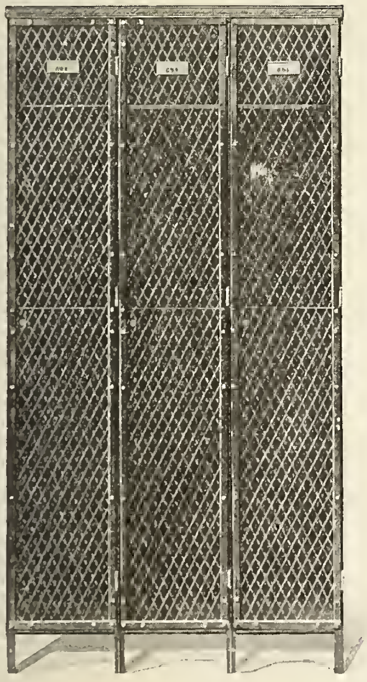

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The Rights of the Lowest Bidder

In another column will be found an extract from a paper by Major Gillette of Philadelphia outlining proposed changes in legislation governing the letting of contracts for public work.

One of the suggestions made by Major Gillette is in favor of awarding contracts to the lowest bidder; "otherwise," the clause runs, "the lowest bidder shall have a legal claim for damages equal to the profits had the contract been executed."

This matter has been a familiar bone of contention among the engineering and contracting interests of Canada and the subject has frequently been discussed in these columns by those interested. A year or so ago somebody came forward with the suggestion that contracts should be awarded not to the lowest tender but to the lowest tenderer but one. Various arguments were adduced pro and con, but in all the letters published in the Contract Record no strenuous argument was made in favor of letting the contract to the lowest bidder.

The Contract Record wishes you Three Hundred and Sixty-Six Days of Prosperity during Nineteen Hundred and Twelve

So that it is refreshing to find an authority as high in the engineering world as Major Gillette with the courage to come forward and openly advocate this principle. It is true that there are many things against establishing a hard and fast rule in favor of the lowest bid, but we are inclined to think that these are outweighed by the abuses which arise from giving municipal and public bodies too much headroom. In Canada, at any rate, it cannot be gainsaid that in the letting of public contracts there has been a great deal of collusion and graft. In a number of cases of our own personal recollection outside firms have been invited to tender when, as a matter of fact, the contract already lay between a couple of local firms.

In Toronto and other eastern cities, British firms have gone to the expense of tendering on municipal supplies and submitted the lowest bid only to learn afterwards that the contract had been awarded to a local firm on the ground that delivery was quicker or that local manufacture would facilitate inspection.

Occasionally there may have been some or even entire truth in these statements, but this is a weak excuse for the general laxity by which such procedure is possible. If it were imperative that the contract should be awarded to the lowest reputable bidder and if this could be enforced in a court of law, the authorities would perforce have to give more consideration to their manner of advertising for tenders. And the only way in which they could secure the work to local firms would be to insert a clause in their advertisements that outside bids would not be considered.

We have used the term "reputable contractor" advisedly because we know that it would be the worst kind of folly to let first-class work to an incompetent contractor. "There again," someone will say, "you have to introduce the element of discretion." Possibly; but not as it is understood now. The burden of proof would rest upon the authorities and they would have to offer conclusive evidence that a contractor was either incompetent or financially incapable.

A Montreal workman who brought action to recover damages for the loss of his leg following an accident which occurred at the defendant's plant, was awarded $3,500 by a jury. The defendant's leg was crushed by the fall of some iron pipe. In the course of the hearing before the jury, it was shown that at the time of the mishap the pipe, which weighed several hundred pounds, was being raised from the ground by means of a chain, the fall being due to a breakage of one of the links. On account of this fact the jury held the company responsible and recommended judgment for the above amount. This judgment was afterwards sustained by the Court of Review, the company having attacked the finding, alleging that the verdict was contrary to the weight of evidence and that the amount of the award was excessive. The principle established was that a higher tribunal cannot set aside the verdict of a jury simply because the proof is contradictory and that a jury award cannot be held excessive unless it is apparent that the jurors in making it were induced into error.

Thirty-seven counties in Michigan have adopted the county road system. A county tax is levied and three commissioners are elected to expent the money thus collected upon permanent improvement of the main-traveled highways. For every mile of macadam road thus built the state pays to the county a reward of a thousand dollars, and five thousand dollars for each mile of gravel road. Thus if a county builds ten miles of good roads the state presents it with enough money to build approximately two and a half miles more. Other counties of the state retain the township system, by which each little locality attempts to look after its own roads. Estimates show that of all the money spent last year under the township system about seventy-five per cent. went for merely patching up poor dirt roads, so as to make them more or less passable for some months longer, when the same amount will have to be expended over again for more patching; while of the money expended under the county system ninety per cent. went to make permanent roads that can be kept in good condition at comparatively small expense. The patching-up plan would bankrupt any railroad in a few years.

Good Roads in Ontario

In the course of a month or so a large deputation from the Ontario Good Roads Association and the various county, township, town and city councils of the province will go to Ottawa to petition the government in respect to co-operation in the Good-Roads movement. The three most important requests are: (1) that the Dominion Government give supplementary aid to any municipality that undertakes the construction of highways according to a fixed standard, making up the difference between the cost of such a highway and one of "approved" standard, toward which the Province now contributes one-third of the cost; (2) that the Federal Government establish a Provincial highway system, similar to the county highway system recently adopted in the Province of Ontario; (3) that the Dominion Government establish a Department of Highways, similar to the Bureau of Highways at Washington.

Growth of Canadian Trade

The annual report of the Department of Trade and Commerce dealing with trade between Canada, Great Britain, and the United States, shows that during the fiscal year which ended last March 31, Canada's total trade with Great Britain amounted to $136,965,111, as against $149,313,984 for 1910. A considerable increase in imports of British goods and a decrease in exports to Great Britain are shown. The imports amounted to $110,586,801, as compared with $95,679,877 in 1910. The exports amounted to $136,965,11, as against $149,634,107.

Canada's trade with the United States for the same twelve months reached a total of $413,812,003. Both imports and exports increased, the former from $239,070,549 in 1910 to $294,415,202 in 1911, and the latter from $113,150,778 to $119,396,801.

The duty collected on imports from Great Britain amounted to $20,756,811 and on imports from the United States $37,854,728.

Theory Versus Practice

Many contractors, especially those of the old school, either cry down or discredit theory and theoretical men, saying that all that is needed in contracting is practice and men who are practical. This is a very common, but erroneous belief, says our Chicago contemporary, The Contractor, and is due to a great extent to either a lack of forethought in speaking or to ignorance. Extremely ignorant and entirely uneducated men always have a high regard for one learned in book knowledge, but a little education seems to carry a man to the other extreme, and he shows great contempt for a man of superior knowledge.

It is true that there are many learned men who have a vast storehouse of theoretical knowledge for instant use, while they are like children in the ordinary affairs of life. One of the greatest mathematicians that the world ever produced was unable by his own admission to take care of a dollar in small change, but the work he did in higher mathematics was of great value to the world. His case was an exceptional one.

There are very practical men without any book learning, who become successful business men, and this has occurred frequently in the contracting field, but a few cases on either side do not make a rule and such cases are rather the exceptions to the rule.

Many prominent and able engineers have upon numerous occasions, stated that each year of their lives they have used less and less theory and more and more practical common sense. This is to some extent true, but they seem to forget that the practical work they do and the excellent results obtained are the fruits of their early theoretical training and are based upon the knowledge then acquired.

This is true of all the practical results obtained in the engineering world. It makes but little difference whether the work is done by a trained and educated engineer or by a so-called practical man with but little education, it is all based upon the theoretical knowledge that has been given to the world by trained minds and much of the success of the practical man is gathered from others who have developed the theory of engineering. Wireless telegraphy is the direct result of the work of Morse's invention of telegraphy and of Bell's of the telephone. Thus results can be traced back in every case if one will take the time to follow up such things. The law of gravitation was used before the time of Newton, but when he discovered and laid down for the world the exact law, then many more practical results were obtained by others, and thus the fruits of their labors can be attributed to Newton's scientific discovery.

The so-called "common sense practices" of any science or art are all derived from or based upon the theory of that science or art.

Theory and practice go hand in hand, theory being the fore-runner or father of all practice. The practical men must acknowledge their debt to the men of theory. Should one man possess but one of these attributes, then he should always associate with him the man who possesses that which he lacks. Of course, if one man is well grounded in theory and likewise has practical ideas, then he is very well equipped for construction work, but the practical man should never forget the value of theory and he should be the first one to acknowledge the debt we all owe to those who have developed the theories upon which engineering and contracting are based.

More Criticism Anent Quebec Bridge Procedure

According to a recent dispatch from London, Eng., the late Laurier Government came in for sharp criticism at the annual meeting of the Cleveland Bridge Engineering Company, which was the only British concern to tender for the construction of the Quebec bridge.

After the receipt of the tenders, the managing director stated, divisions arose among the commissioners, resulting in the resignation of the chairman. The Canadian Government accepted a tender of about £1,800,000 from a Canadian competitor for the construction of the railway bridge, and which did not conform with the conditions of the specifications.

The action of the Laurier Government was considered an outrage, as, had other competitors taken liberties with the specifications the tender for the £1,800,000 bridge would not have been the cheapest. Moreover, for that amount they would have been provided with a cantilever bridge and approaches also to carry heavy railway tracks, two wagon roads and tramway lines. He did not think behaviour of this sort would commend itself to the commercial community of Great Britain, who, directly or indirectly, had found some £400,000,000 for Canadian development in the past. That the ethics which govern honorable men in private affairs might be ignored in public affairs seemed to have been the indifferent principle of the late government in this connection.

Quebec Bridge Contract: A Defence of Contractors' Guarantees

In an interesting letter contributed to the Engineering News (December 21st), Mr. Daniel B. Luten, of Indianapolis, takes issue with Mr. Gustav Lindenthal upon a number of points contained in the latter's article reproduced in our issue of November 29th.

Mr. Luten writes in part as follows:

"Mr. Lindenthal regrets the parsimony of engineering fees at the first Quebec letting and also criticizes the method of conducting the second letting. He believes that had Mr. Cooper received a larger fee he could have checked the contractor's design and thus have avoided the first failure.

" A letter conducted as was the second, on the engineers' detailed plan, however lavish the fee, has no satisfactory provision for such checking unless it can be placed on the contractor. The contractor's engineers, being ordinarily more expert specialists than the consulting engineer, would provide a more satisfactory check even than an independent engineer. But the only way the contractor can be compelled to check is by requiring him to guarantee the structure as to design as well as workmanship and materials. Mr. Lindenthal is therefore inconsistent when he bemoans the lack of engineering fees at the first letting which resulted in collapse by failure to check the contractor's plans, and at the same time criticizes the increased cost that resulted from a guarantee by the contractor on the engineer's plans at the second letting.

"Mr. Lindenthal says:

'The old bridge fell down; it was the fault of the engineers. Engineers are irresponsible; they have no wealth. They cannot respond in damages, but the contractor can, so if he is anxious enough for the contract and the profit from it, put the whole thing on him. What a conception of professional duty, honor and dignity for engineers!

It is quite true that the contractor has and should have the sole responsibility for the erection of the structure, as the erection, once its method is decided upon and approved by the engineer, depends largely on the management and organization of his own forces and appliances. But this responsibility is sharply distinguished from that for the design and for the strength and safety of the bridge and for its erectability. This should be wholly the responsibility of the engineer.

Engineers who draft such specifications or countenance them, make the engineering profession ridiculous, and lay it open to the reproach, not infrequently heard in the press and from public men, that they lack in executive and administrative ability.'

"The Canadian Government was endeavoring to erect a bridge, which was not primarily an effort to elevate the honor and dignity of engineers. The latter is incidental to the former. When the old bridge collapsed much honor and dignity of engineers went with it, but that did not materially help the Canadian Government. That a lesson was drawn from that failure is shown by the fact that the second letting the contractor was made responsible and no further chances were taken on the honor and dignity of engineers.

"If engineers cannot guarantee their work with something more material than honor and dignity, they should place the responsibility on the contractor, who need not bid if he does not wish to assume the burden. Why should the innocent purchaser, whom both engineer and contractor are endeavoring to serve, be compelled to pocket a loss for which only the latter are at fault? The contractor, who can be held legally responsible, is anxious to shift it to the engineer who cannot be held but who is willing to trust to "professional duty, honor and dignity." That engineer is lacking in administrative ability who neglects such safeguards in his specifications.

"The responsibility for design and erection can not be sharply distinguished, and nothing is much more difficult than to determine whether faulty workmanship or faulty design is responsible for a collapsed structure. Therefore, combine the two, lessening the danger of defective work due to lax inspection, and allowing the contractor to share in some slight degree of honor and dignity, bearing in mind that the purchaser's interest should be held paramount to all others."

A strange discovery lately made in the walls of the old palace of the Louvre shows that reinforced concrete was by no means unknown in Paris as far back as the sixteenth century, when the rebuilding of the Louvre was undertaken by that industrious builder, Francis I. The Builder states that, when executing works in connection with the application of a modern lift, the workmen employed found it necessary to cut through some of the old walls, which were apparently of dressed masonry. But, to the surprise of the contractors, it was found that the stone was nothing but the outer shell of construction, largely composed of a kind of reinforced concrete. In view of the generally entertained belief that this is an essentially modern variety of structural material, the proof of its employment between 300 and 400 years ago is distinctly interesting. Our contemporary states that someone with archaelogical tastes has taken the trouble to search the archives for records left by the architects of the epock in question, with the result that no mention was found of anything but dressed stone for use in the walls. It seems, therefore, that the original contractors, with more wisdom than honesty, decided to make sure of reaping the benefit attending the adoption of reinforced concrete as a substitute for stone masonry.

The City of Baltimore proposes to resurface 25,000 square yards of streets which are now paved with cobble stone by paving over the present gutters with concrete, thus changing the contour of the streets slightly, and then placing 1½-inch binder on top of the present cobbles and the concrete gutters; a 1½-inch topping course of high-grade asphalt being then placed on top of the binder.

Principles Governing Public Contracts

Suggested Legislation to Prevent Collusion and Other Abuses—Noteworthy Clauses Applicable to the Canadian Field—The Lowest Tenderer, &c.

The principles which it is suggested should be embodied in every law covering the letting of public contracts, were outlined in a valuable paper by Major C. E. Gillette, of Philadelphia, presented recently before the American Society of Engineering-Contractors. The suggestions by Major Gillette will no doubt be found especially useful as a guide to engineers in the drafting of specifications and contracts.

(1) All expenditures of public money for supplies and construction work in amounts of $100 or more shall be by formal written contracts. Purchases of less than $100 may be by written proposal and written agreement duly filed.

(2) No bid shall be asked until an actual appropriation of funds has been made for the work or supplies, and before bids are asked for public contracts, official itemized estimates of the cost of the proposed work shall be made and permanently filed in the office of the public official who invites the bids.

(3) All public contracts involving an estimated cost of $5,000 or more shall be advertised in three local papers having the largest sworn circulation, and in at least one trade journal of suitable type, sufficiently far in advance of the opening of bids to give the most distant bidder in the State a reasonable opportunity to see the notice in time to submit a bid after due investigation.

Contracts for less than $5.000 shall be so advertised that every bidder residing in the municipality (or county) in which the supplies are to be delivered or work done shall have a reasonable chance to see the advertisement or receive the notice in time to submit a proper bid, and every official charged with the duty of purchasing supplies or making contracts must keep in his office lists of all dealers or bidders who request their names to be put upon such lists whenever such work and materials as they specify shall be desired by the official, and notice sent them in ample time to submit bids.

Purchases and contracts involving less than $100 may in emergencies be made by telephone, provided at least three bids be obtained, and the bids and prices be scheduled for public inspection, all the bids and the acceptances to be confirmed in writing.

In case of contracts for yearly supplies to be delivered as needed, purchases shall be by single items. The lowest bidder for each item shall be given the contract for that item, provided that if any bidder does not thereby secure items for which the estimate for the year in question or the actual use for the preceding year shall amount to at least $100, such items may be awarded to the bidder who bid the next lowest for each item.

(4) Specifications for public contracts shall in all cases comply with the following requirements:

(a) They shall be clear, definite and complete, expressed with words used in their dictionary meaning and showing exactly what is required in the literal use of the words, which literal meaning must be used in carrying out the contract. If in any case questions arise in the execution of the contract that cannot be clearly answered by the specifications, the matter shall be adjusted by arbitration in which the contractor shall select one arbiter, the official the second, and they two shall choose a third. Provided, the contractor or any citizen or corporation doing business in the State shall have the right to take the matter into the proper court.

The advertisement, instructions to bidders, specifications and contract form must together cover all necessary information to bidders. They must be concise. Unnecessary verbiage and repetitions must be omitted. Everything must be said once, clearly, and once only.

(b) They shall be itemized in full detail, the unit of every kind of material entering into the structure appearing in the schedule of prices bid.

(c) No responsibility for contingencies shall be specifically put upon the contractor.

(d) The specifications shall be so worded and all arrangements and management concerning the bidding shall be such that all bidders shall be bidding upon fair terms for exactly the same structure or the same result. and upon terms of exact quality as to advantages or disadvantages in so far the official calling for bids can control or embody in the bid or award.

(e) The terms "discretion of the engineer," "judgment of the engineer" or their equivalents shall not appear in any specification or contract as calling for their exercise after the opening of bids, unless they be accomplished by full explanation in the specifications showing exactly how they will be exercised in the case of any of the various contingencies with reference to which they are used shall occur.

(f) No requirement shall appear in the specifications that have a tendency to discourage bidding unless such requirement is manifestly essential to the work or to the public interest.

(g) There shall be no requirement in the specifications or in the management of the bidding that shall require any citizen to disclose the fact that he contemplates bidding or is interested in a coming bidding.

(h) Specifications must be so arranged that in comparing bids only one thing is to be taken into consideration, the total cost of the work.

(i) The specifications and drawings must all be ready for distribution and freely distributed as soon as the advertisement appears. No charge in excess of actual cost shall be demanded for any specifications or drawings accompanying them. They must be sold or furnished free to any one who asks for them without requiring any information from the party asking for them, and they must be returnable at cost after the opening.

(j) No specification shall require the contractor to follow the specifications and at the same time be responsible for accomplishing certain results, or to guarantee the endurance of the work, or to be responsible for the repairs for any time after the completion of the work according to the specifications.

(k) Specifications or instructions to bidders must suggest that every bid should be enclosed in two envelopes, the inner sealed with wax and the outer not showing that a bid is enclosed.

(l) The official estimate shall be printed in the specifications with the information that no award shall be made for an amount greater than the total of the estimates and no supplemental contract increasing the work beyond that limit will be legal. Also that no bid will be accepted in which the price bid on any article is more than ten per cent. greater than the estimate. and that if in the execution of the contract it be nevessary to increase the amount of any item more than ten per cent. beyond the estimate, the price of such increase shall be determined by arbitration subject to court action, as specified in Sub. Par. (a) above.

(5) Every citizen and every corporation doing business in the State shall have the full right to bid on any public contract and have the bid accepted if it is the lowest.

(6) Bids shall be opened in public. All bids received must be kept and opened. Bids with erasures or changes in figures that affect the cost of the work must be thrown out. The public shall have the right to inspect the bids at the opening.

(7) Whenever bids are advertised for, they must be opened at the time mentioned, and an award must be made to the lowest bidder. Otherwise, the lowest bidder shall have a legal claim for damages equal to the profits had the contract been executed.

(8) Any citizen of the State and any corporation doing business in the State shall have the right of injunction in the proper court to require compliance with this law, and such citizen or corporation shall have the further right to appear as a party in interest in any suit or adjudication between the contractor and the city official whenever the matter of public contract comes before the court.

(9) In the execution of all contracts, inspectors duly appointed according to law by the public official shall have full power to see that the specifications are literally carried out and the completion of the work or the deliverp of the goods shall be followed by the proper certificate of the inspector that the work and materials have been in accordance with the specifications. This shall relieve the contractor of all further responsibility.

Repairing Ashphalt Pavements

The Chicago Bureau of Public Efficiency calls attention to a number of undesirable conditions and practices connected with repairing asphalt pavements by contract in the city of Chicago. A number of the criticisms will apply to methods employed in other cities as well, but which should, it would seem, be remedied as quickly and conclusively as possible.

One of these is the method of payment for such repairs. The Chicago practice is to pay the contractor a fixed price of $7 per cubic yard for concrete in foundations and $5 per ton for binder; but to pay for the surfacing material by the square yard at a price bid by the contractor. The repairs are supposed to consist of 1½ inches of surface material, and 1½ inches of binder if the depth of the patch will permit it. The reason for paying for the binder by the ton or volume rather than by the square yard is undoubtedly because of this variation in its thickness, and would seem to be a valid one. The temptation, however, is for the contractor to use an excess of the material for which he is paid by the ton, and thus lay an insufficient thickness of the material for which he is paid by the square yard. This temptation is believed by the Bureau to be heightened by the payment of an unnecessarily high price per ton for the binder —$5, especially in view of the fact that the contractor is permitted to use, in the preparation of the binder, old paving material removed from the street. As a matter of fact the Bureau claims to have found that, of 370 measurements made on the west side of the city, twelve showed the thickness of the top surface to be more than 1½ inches, 27 just 1½ inches, and 331 less than 1½ inches and averaging 1 1-64 inches. One hundred and sixty-seven were not more than one inch in thickness.

In order to avoid this slighting of the wearing surface, it is recommended that this be paid for by the ton or cubic foot, as is the binder. Also that the wearing surface be under no condition less than 1½ inches thick; and where the total thickness of both wearing surface and binder is less than 2½ inches, that the binder be omitted and the repair be made with surface mixture only. It is also recommended that bids be received for the binder as well as for the surface mixture; as the method of bidding now employed in Chicago produces the same results as an unbalanced bid by a contractor, and offers the same temptations and opportunities for defrauding the city.

Another defect in either the specifications or the practice has to do with the removal of the old pavement. In removing defective pavement it is the custom to raise it from the foundation with a pick or bar and break it off with a cutter. This method causes the pavement to be lifted beyond the line where it is cut, and thus destroys the bond between the binder and the concrete base of a portion of the pavement left in. Inspection in Chicago showed instances where this extended 18 inches under the retained pavement. The proper way would be to cut nearly, if not completely, through the top and binder before prying up the pavement at all.

Attention has frequently been called by engineers and paving experts to the objectionable features of dumping asphalt in place, raking only the top of this pile onto the foundation and leaving the bottom where it was first deposited. The latter material is then more compacted than the other, and no amount of raking and rolling will prevent this from causing an unevenness in the pavement. The material, after being dumped, should all be turned and distributed to place, so that all may be deposited and raked under similar conditions.

A practice which, while it may not be objectionable from the point of view of the excellence of the repair, results in an enormous loss to the city, is that of cutting out larger patches than are marked by the inspector for removal, the contractor being paid for the size of the patch actually made. The remedy for this would apparently be to have the inspectors insist upon the cutting out of the old pavement exactly along the inspector's lines.

Another faulty practice in violation of the specifications was found to be the use of binder which was not sufficiently hot, and the failure to roll the binder before the application of the surface coat. Each of these results in a later compression of the binder and in consequent formation of hollows in the surface of the pavement.

A comprehensive programme of road building is being arranged for 1912 by the B. C. Government according to The Hon. Thomas Taylor, Minister of Public Works. Last session the appropriations for roads amounted to about five and one-half million dollars. It is expected that the amount will be largely increased this season. It is realized that the future of the province depends greatly upon its transportation facilities and every consideration will be given to the settler in the fertile northern belts of the province.

The manufacture of asbestos shingles has grown so rapidly that it is anticipated that at no distant time three-fourths of the asbestos product of Canada will be made up into roofing material.

A Portable Hypochlorite Disinfecting Plant

What was probably the first portable emergency hypochlorite plant is described in a recent issue of Engineering and Contracting by Mr. J. A. Childs, Assistant Engineer to the Minnesota State Board of Health, who writes:

The experience at Hibbing, Minn., in the early part of June, 1910, had shown the necessity of having some means of quickly disinfecting a public water supply when subjected to sudden pollution. Mr. H. A. Whittaker, the Chief Chemist and Bacteriologist of the State Board of Health, at that time suggested the idea of the State Board of Health owning and maintaining an emergency hypochlorite plant, compact and light enough so that it could be readily shipped to any municipality in the state suffering from a sudden epidemic of water-borne typhoid or dysentery, where it could be set up and put into operation within a few hours of its arrival.

A plant was accordingly constructed, the design being changed and simplified from time to time as experience indicated, until the plant described in this article was adopted.

A plant consists of one mixing barrel, two storage barrels, and a regulating keg.

The mixing barrel is a fifty-gallon oak barrel, equipped with a hand-driven device, as is shown in Fig. 1. The sheet iron cone is attached to and revolves with the vertical shaft. Two sheet iron stirring blades are riveted to the outside of the cone, which, revolving, create a downward current through the cone and an upward current outside.

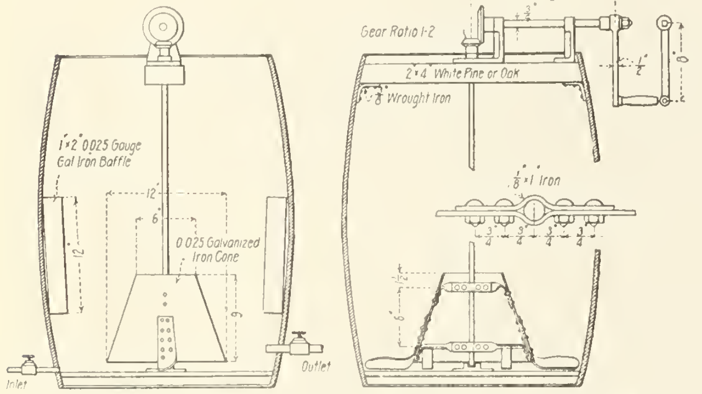


Fig. 1.—Details of Hand Operated Hypochlorite Mixer

The storage barrels are fifty-gallon air-tight oak barrels, equipped with nipples, valves and hose, as shown in Fig. 2.

The regulating keg, as shown in Fig. 2, is equipped with a one-half inch brass pipe which can be slipped up or down through a rubber washer at the bottom of the keg. The solution flows from the keg through a one-quarter-inch hole in the brass pipe.

A small hand solution completes the outfit. Where there is sufficient head room, the solution pump is dispensed with, the solution flowing by gravity from the mixing barrel to the storage barrels.

The operation of the plant is as follows: The required amount of calcium hypochlorite is placed in the mixing barrel "A," which is then filled with water, and thoroughly mixed for a period of three or four minutes. The mixture is allowed to stand for a half hour, during which time the particles of hypochlorite which do not readily go into solution will settle. The supernatant liquid is then drawn off into one of the two storage barrels.

Consider storage barrel B to be filled. (See Fig. 2). Valves 1, 2, 3 and 4 are closed and valves 5 and 6 opened. The solution will flow from storage barrel B through valve 6 into the regulating keg D. Air to replace the solution thus drawn from storage barrel B will enter it through the air pipe connected with valve 5, and will continue to do so until the solution in the keg rises to the opening of the air pipe F in the regulating keg. Then the supply of air to the storage barrel will be shut off, and the solution will cease to flow from the storage barrel. The surface of the solution in the regulating keg is thus kept at a constant level, varying not more than one-quarter of an inch. The rate of flow from the regulating keg is determined by the depth of the one-quarter-inch hole below the surface.

From the keg, the solution is usually piped to the suction well or to the suction main of the pumps. Where conditions are such that the presence of small amounts of air in the suction pipe interferes with the operation of the pumps, it is sometimes necessary to allow the hypochlorite solution to flow from the keg into a basin, to which additional water is supplied. The surface of the water in this basin is kept at a constant level by means of a float valve on the inlet pipe, which supplies the additional or diluting water. From the bottom of this basin, a pipe leads to the suction main of the pumps, the water in the basin forming a seal and preventing air from entering.

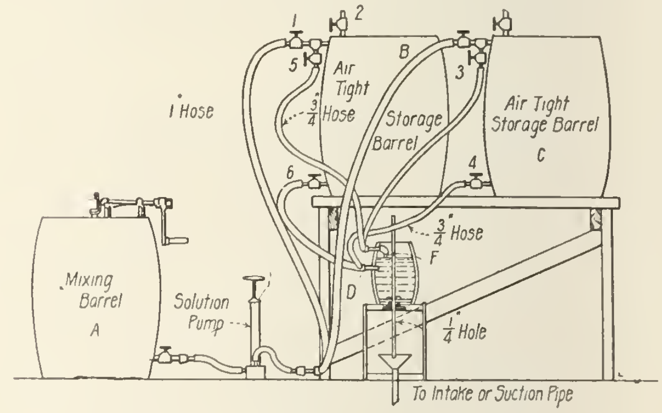


Fig. 2.—Hypochlorite Plant Assembled

In a small city where a permanent hypochlorite plant is necessary, the above described emergency apparatus, with a few changes, such as the substitution of galvanized iron piping, for the rubber hose, and a power-driven mixer for the hand-operated one, can be used.

With a plant of the type described above, it is possible to treat water at the rate of from less than 25,000 gals. to over 1,000,000 gals. in twenty-four hours. One of these plants was constructed complete at a cost of $42.

The plant was designed by the writer under the supervision of Professor Frederic Bass, Director of the Engineering Division of the State Board of Health, from whom many valuable suggestions were received. Credit is given Messrs. H. Allison and R. Cowling, chemists, who, while in charge of a plant at Hibbing, Minnesota, were the first to apply the principle of the air-tight barrels in the application of hypochlorite.

Proposed Mount Royal Hotel, Montreal

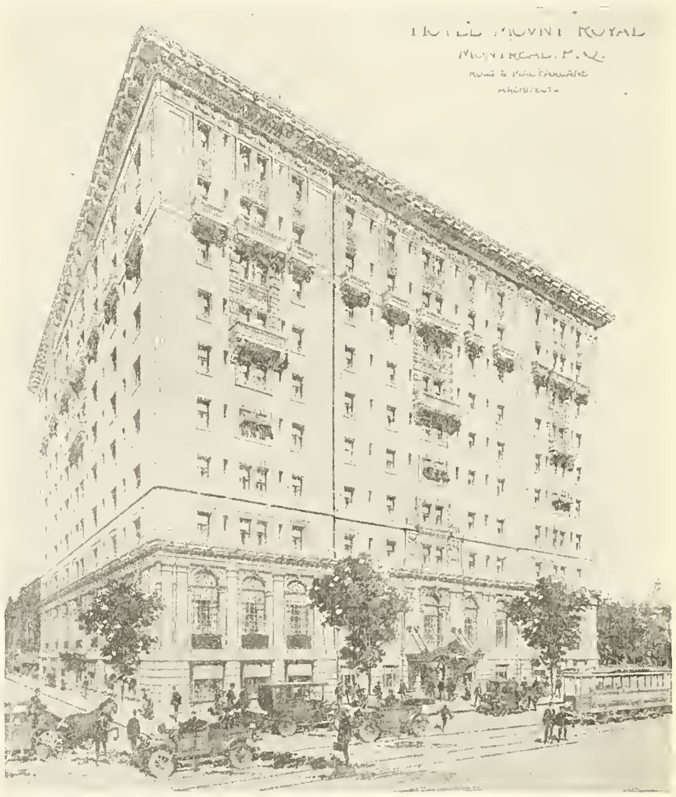
Magnificent Ten-Storey Structure which will Rival the Best of New York City—Details of Design and Construction

Architects: Messrs. Ross & MacFarlane, Montreal

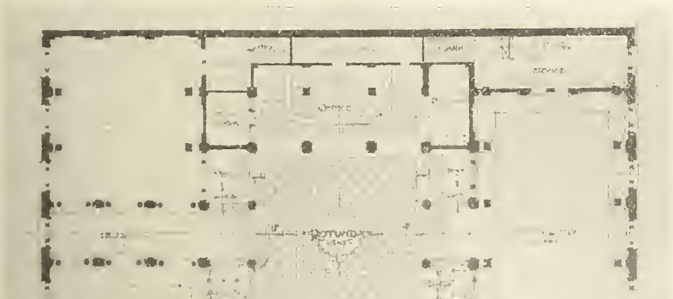
The proposed Mount Royal Hotel, which is to be erected at the corner of St. Catherine street and Peel street, Montreal, will supply a long felt need in the Commercial Metropolis. For years Montreal has been deficient in hotel accommodation. The construction of the new building will be commenced next April. It will be ten storeys in height, 130 feet above the street level and two storeys below. When the city building by-laws are revised, additional storeys will probably be built. The Mount Royal Hotel will contain 350 bedrooms and with the land will cost about $2,500,000. One of the most notable features of the design is the excellent solution of the ground floor plan. The main entrance to the rotunda will be from Peel street by means of about eight steps. The dining rooms and cafe on either hand are reached by two flights of steps. By this means these latter rooms are situated about sixteen feet above the actual street level and the visitor has not received the impression of having gone up stairs, while that most valuable space on the street level has been preserved for high class stores, which will command a substantial revenue, not only from their excellent location close to this traffic centre, but also from the fact that the hotel trade will in itself be a big feeder. It will also give the effect to the observer that the entire area comprising the rotunda, dining room and cafes are bound together in one general scheme, equal to that occupied by the entire hotel.

The men's cafe on the main floor, and the main dining room on the mezzanine above are situated on the south side overlooking Dominion Square and Peel street. Each has immediate connection with the rotunda, the dining room having balconies overlooking it and a marble staircase communicating with it. On the other side of the rotunda, on the mezzanine floor, the ladies' lounge and tea room overlooks this large central hall in a similar way, having an outlook on Peel street and St. Catherine street. These rooms all require a quick and easy communication with the kitchen and other offices; this has been provided for by means of one direct staircase communicating from all to the kitchen. Concentration, without crowding, has been studied here and elsewhere throughout, which should result in perfect operation and a quick service.

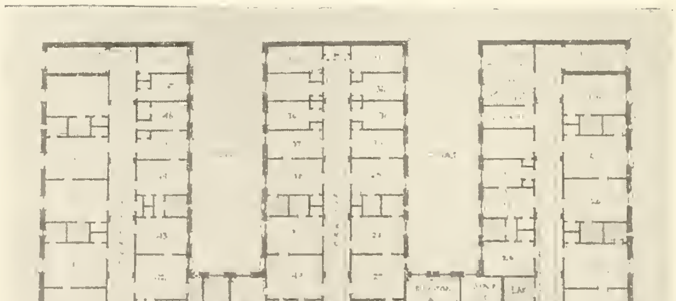
The approaches to all parts of the building, lead from the rotunda, the hotel office having a commanding view of these and also of all entrances from the street.



On the first floor are to be placed a series of private dining rooms for social functions and conven-



Ground Floor Plan



Typical Floor Plan

tion purposes. There will also be private suites, parlors and writing rooms. About 80 per cent. of the bedrooms will be equipped with private bathrooms.

The equipment of the building will include a complete direct and indirect heating system and ventilating plant, local generation of electricity for light and power, filtration which will include a separate circulation of filtered drinking water in every guest's room in the hotel, and a telephone system.

The building will be of steel skeleton construction with fireproof floors, walls and partitions; the exterior walls will be of marble. It is the architects' intention to have the steel frame fabricated and the stone cut during the winter so that when construction starts in April next rapid progress can be made.

The exterior of the building is to be constructed of white marble, supplied by the Missisquoi Marble Company, of Phillipsburg, Que.

The general contract for the building has been awarded to Messrs. P. Lyall & Sons, Montreal. Messrs. Ross & MacFarlane of Beaver Hall Hill, Montreal, are the architects.

Fireproof Construction

There are two factors that stand foremost to-day in the matter of construction, one of which, at least in the past, has been considered in a kind of vague or desultory way by the majority of builders, says Warfield Webb in The National Builder. This refers to protection against fire. It was but natural, to a great degree, that such should be true. It was not altogether carelessness or ignorance, grossly speaking, but came of a lack of knowledge of the proper materials that would resist the flames to a greater degree.

Beauty is the other factor that comes in for a more general consideration now. If we are to combine beauty in with fire-resisting attributes in the matter of building construction, shall we not have the highest ideals that are possible? If a building is beautiful and still lacks in ability to resist the all-devouring element of fire, there is little use to expend money in rearing it. The element of constant danger is far too great to repay one for the outlay.

It is beginning to become more universally recognized as a fact that this is so. Men are now combining these two important details into one, and the result must be the highest possible ideal in house construction. There are several reasons for this change. One is due to the increased losses from fires annually in this country. These have grown with bounds almost unprecedented in the world's history. Then there has been the steady rise in fire insurance rates, made possible by the disregard for the risk in erecting our buildings of materials that will prove a bulwork against fire. It was noted that the most elaborate structures were sometimes destroyed within a short time on account of laxity in protection.

These were sufficient at least to awaken in the minds of the building public a desire for a greater caution, and the outcome is now seen in the care that is being made in the matter of constructing many of our buildings. Some of us, and it may be added that this includes a large number, have had to learn these things from actual experience. We might have deplored the loss that was sustained by others, but it has taken an actual loss to ourselves, in a number of cases, to prove the real necessity of more and greater protection.

It must not be supposed that this protection can be had simply by making the walls of the structure fire resisting. The beams, girders, joists, studding, floors, partitions, windows, roof, all these must combine to reduce the risk that is encumbent upon every structure. The more congested our cities become the greater danger from fire, unless we all unite in building to prevent the spread of flames. If one owner will erect a fireproof building and another a semi-fireproof structure, there will be at least some danger to some property. What is desired is the entire erection of buildings that will withstand the ravages of the flames, and in this way save us many thousands of dollars losses annually.

The old fear and the old story of first cost has stood in the way of progress along this line for years. That the average builder cannot afford to erect a building that is proof against the flames is no longer an argument against the erection of such buildings. Can he afford to take the risk, and can he afford to pay the increased insurance rate in order to save a few dollars in the first cost? If he cannot afford to build in a sane way far better had been that he build not at all.

Along with the demand for better buildings, and more pleasing forms of architecture, there must come a greater revision of our building laws. Without this assistance there shall continue to be a large number of buildings erected that will serve only as inviting fires, and of endangering lives and other property with a greater or less amount of loss.

Our laws should be as iron clad as our regulations against the spread of disease. In protecting the lives by our health departments we should seek to protect them from the awful results of fires. There have been instances in the past few years appalling in their consequences, as statistics will prove, that could and should have been prevented.

It must be stated that there are many buildings to-day that pass muster as fireproof, that will not withstand the flames an hour. These are still being erected under the guise of fireproof buildings. The fault lies for the most part in our laws. They are weak in some respects, and the only way to make them perfect is through Government action. Make them universal, as far as certain points are concerned, and in this way secure the lives and the property of many who now are satisfied to risk so much for the sake of saving a few dollars.

Reinforced Concrete Raft to Support Tower

In connection with the rebuilding of Holy Trinity Church, Kingsway, London, a reinforced concrete raft was constructed to support the main tower, which is described in detail in a recent issue of Concrete and Constructional Engineering, London.

The total weight of the church tower when completed will be about 2,500 tons, but at present this portion will not be carried beyond the level of the church roof, which represents a weight of about 1,200 tons.

Owing to the settlement which must necesarily take place when the remaining 1,300 tons is added at some future date, the tower foundation has been designed to be entirely independent of that of the front or entrance portion of the church, or of the body of the church itself, and intentional lines of weakness are arranged on each side of the tower. Any such settlement of the tower will not interfere with the remainder of the building, and will then involve very slight repairs.

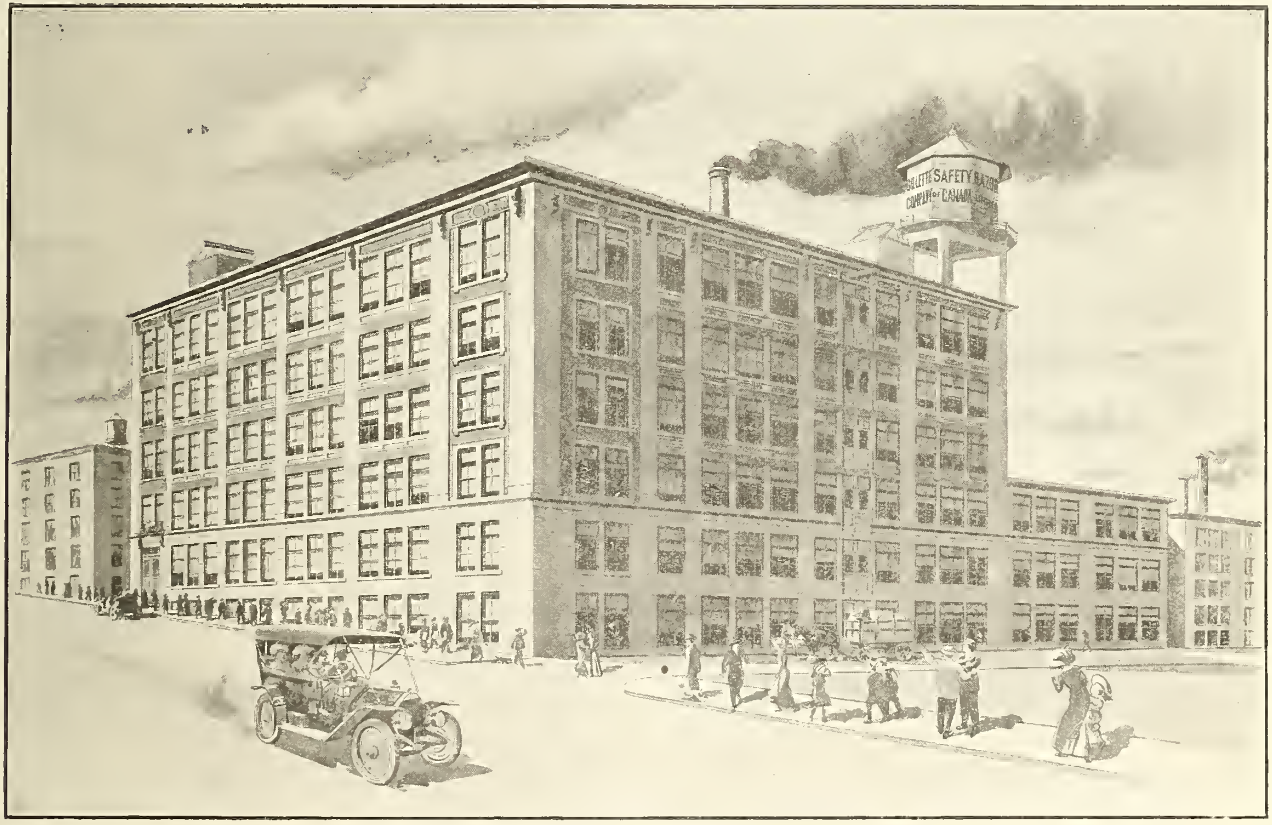
The reinforced concrete raft itself measures 30 ft. by 33 ft., and consists essentially of a lower slab supporting two main beams, on which the four corners and intermediate walls of the tower rest, the lower slab itself being stiffened by means of small cross-beams running between the main beams and beyond same to the edge of the slab. The slab is 12 in. thick, the two main beams on the top of the same are 4 ft. wide by 4 ft. 3 in. deep, and the seven cross-beams are 2 ft. wide by 2 ft. 9 in. deep.

New Office and Factory Building at Montreal

The Gillette Safety Razor Company of Canada, Limited, are now constructing, on Alexander street, Montreal, a building which will serve as offices and factory. It consists of five storeys and a basement, each storey having 12 feet clear height without ceiling beams, and a floor space of 9,000 square feet to a floor. In addition there is a two-storey wing, with an area of 1,000 square feet. The main building measures 115 feet by 82 feet. As will be seen from the cut, the structure is of reinforced concrete on the Mushroom (Turner) system, the front being of concrete made with crushed granite, which, when bush-hammered, will give the appearance of granite.

The floors are finished in hardwood, and the offices will be equipped with modern devices. The building is being lighted on the four sides, and as there are no ceiling beams to obstruct the light, it will be unusually well provided for in this respect. The health and comfort of the employees have been well looked after, features being mechanical ventilators to ensure frequent changes of air and the provision of hygienic drinking fountains.

The building is fireproof, and is equipped with a sprinkler system. Two electric elevators, one a passenger and the other a combination freight and passenger, will be installed. The company will occupy the basement and first floor, and will rent the other portions of the building for offices. The architects are Lockwood, Greene & Company, Boston.



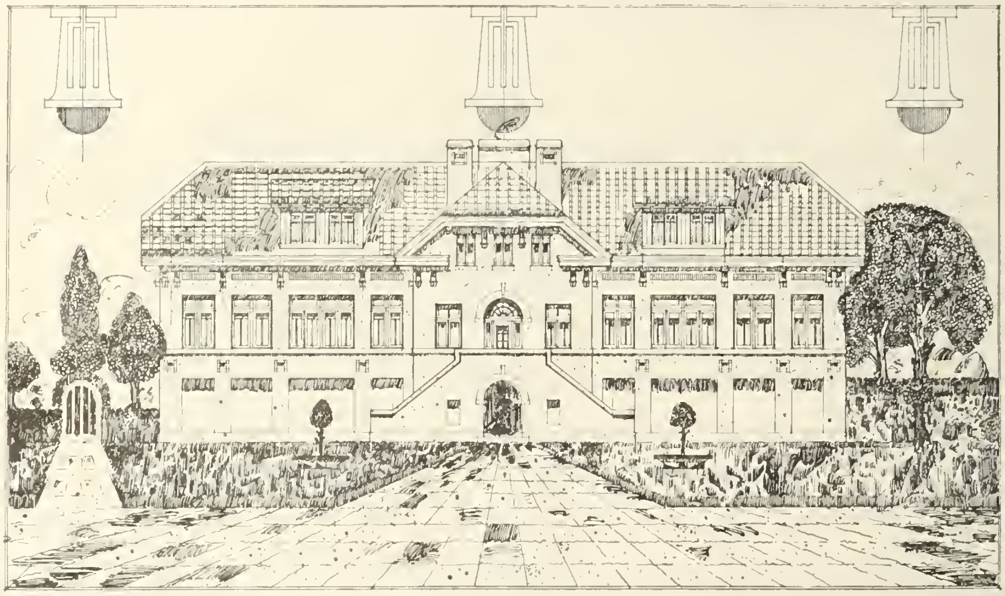
New Building of the Gillette Safety Razor Company, Montreal

The History of Plaster Work

An interesting paper, entitled "The History of Plaster Work," was delivered on December 13th before the Calgary Builders' Exchange by Mr. Robert Macfarlane. Plaster, said Mr. Macfarlane, had a long and honorable connection with the building trade. In fact it dated back to the very beginning of constructional enterprise. An investigation of its past would take one back to the dawn of social life, until its origin became quite mythical. Some of the earliest plastering which remained to us, excelled in its scientific composition that which we see at the present day, telling of ages of experimental attempts. The pyramids of Egypt contained plaster work executed at least four thousand years ago. Indeed where not disturbed by wilful violence, it dated back much further, outvying in durability the very rock which it covered. However humble plaster might seem, compared with marble and expensive woods, it still remained one of the most practical fire-resisting materials.

Like many other wholesome and useful mediums, plaster could be badly made and indifferently applied. This was due to the incapacity of man and not to defect in the material. For all kinds of lime plaster it was of the utmost importance that the lime should be thoroughly slacked and mixed with a proper amount of good clean sand, hair and water and the whole thoroughly incorporated and tempered before using. During the middle ages, plastering existed only as a craft; its highest function was to prepare a surface to be painted on. There seemed to be a growing tendency towards the re-introduction and use of decorative plaster work by modern architects, Mr. Macfarlane said, and it was desirable that plasterers should have a thorough practical knowledge of this branch of their craft. There were good brick plasterers and artistic modellers at the present day who were able to carry out such work if opportunity afforded and it would be in the interest of the trade if some effort were made to augment the demand. The speaker concluded by urging that city and art bodies afford opportunities to the plaster art student to assemble sketches and the best examples of the work of the trade.

The paper was received with much interest by the Calgary Exchange: as a practical proof of which we have the information from Mr. Arthur Chamberlain, Secretary of the Exchange, that Mr. Macfarlane's address resulted in the formation of a technical evening class in Plain and Ornamental Plastering.



Proposed Sanitary Hospital for Smallpox Patients at Ottawa. Architect, Mr. Frank C. Sullivan, Ottawa.

Smallpox Hospital at Ottawa

The Ottawa Board of Control recently called for tenders for the construction of a sanitary hospital for the accommodation of smallpox patients. The architect's drawing is reproduced herewith. The accepted plans were prepared by Mr. Frank C. Sullivan, of Ottawa, and were approved by Dr. Hodgetts, Chief Medical Officer of the Canadian Commission of Conservation. The building is to be 107 x 37 feet, of concrete construction and fireproof throughout. There will be accommodation for thirty patients. The structure will be built on Porter's Island, in the Rideau River. It will be cut off from the remainder of the island by a stone wall. The estimated cost is $28,000.

Logan Waller Page, U. S. Agricultural Department, has secured and dedicated to the public a patent for a cement concrete and method of mixing and preparing the same. The methods consists in adding to an ordinary cement and water mixture a quantity of non-volatile mineral oil. The oil is added before the cement begins to set and the quantity of oil used does not exceed 25 per cent. of the cement.

Antiquity of Hollow Tiles

A writer in the Chicago News makes the following comments on the use of hollow building tiles:—"I will admit that stucco when applied upon wood or metal lath attached to wood studding makes a wall of small value as far as insulation is concerned. If people would build houses, the walls of which were composed of hollow tiles, with stucco exterior, I am sure that they would have no cause to complain about the high temperature within the building in the summer or low temperature in the winter. Probably many are not acquainted with hollow tiles, as they are considered by many a new building material. We do not know the exact date or period when this type of material was first used, but we have found hollow tile walls in buildings devoted to bath purposes in the buried cities around the Bay of Naples. The people at that time recognized the efficiency of dead air space as an insulator, and therefore used hollow tiles for walls of the 'hot rooms.' Stucco and like substances for coating exterior walls were used a great many years before the pyramids were ever thought of. The person who said that there is nothing new under the sun was no doubt correct. He probably repeated the statement made by somebody centuries before. There is no question, in my mind, that the stucco and the hollow tile of this period are the best of their respective classes of material that have ever been produced."

A statue of King Edward VII. is being executed in Carrara marble for erection at Tiverton, England. The figure is being carved from a block which when commenced upon weight over 10 tons. The statue will be 8 ft. in height, and will rest upon a pedestal of similar height of Dartmoor granite.

An effort will be made by the Vancouver Society of Architects to have the competition for the plans for the Point Grey university thrown open to architects throughout the Dominion.

Methods of Tunnelling in Clay Ground

Progress and Profits dependent largely upon Successful Organization—Selection of Machinery—Distribution of Labor—Details of Construction.

Specially contributed by A. C. D. Blanchard, City Engineer of Lethbridge, Alta.

IF it is true that nothing succeeds like success, it is equally true, and especially in tunnel construction, that nothing is so organic to success as organization. In tunnelling, perhaps more than any other class of work, progress and profits depend entirely upon the balance of forces, upon the strength of the weakest link, and upon the ability of each unit of the organization to maintain the standard set and to perform just that amount of work necessary to keep everything running at maximum efficiency. If there is a delay at any one point it is time lost for the whole force. A well paid tunnel outfit standing idle is an expensive luxury.

It would be impossible in a short article to discuss to any advantage tunnelling in general, therefore the subject has been narrowed to include only a certain phase of the question. For the present purpose tunnelling in clay has been selected, yet many of the points brought out, particularly with regard to organization, can be applied equally well to rock tunnelling.

The advantages of tunnelling under city streets are obvious when it is by any means possible from the standpoint of economy and convenience. Economy and contractor's convenience can be figured very closely, but when convenience to the public is taken into account, we are at a loss to estimate exactly in dollars and cents the actual value to the citizens at large—who doubtless have to pay for the improvement whether it is sewer or whether it is public service conduit.

Each contractor in contemplating a new job establishes his own ideals and works up his methods in an endeavor to attain them, and if what is said here will be of any aid in perfecting in any way a contractor's methods in execution of tunnel work, the purpose of this article will be more than accomplished.

Even in clay excavation, conditions are never the same in two places, but the general methods indicated may easily be adapted or turned to advantage especially by such contractors as are not very familiar with the loss of work under consideration.

Excellency of organization then is the prime factor. Next comes the necessity of proper proportions. This may really be defined as the organization of details. By this is meant the selection of machinery and number of men for each separate purpose so that all will be working at full capacity, thereby securing the greatest efficiency. It includes the general layout of the work, and number of shafts, the length of headings, the corresponding size of cars and skips, or buckets, for muck and lining materials, the character of the hoisting plant, the decision as to progress required upon which hangs the number of shafts in operation at once and the consequent amount of plant necessary. This in turn is balanced against overhead expenses, which are of course reduced with accelerated speed of construction.

No definite rule can be given for fixing the distance between shafts. This is governed by the following:

1. Cost of excavating each shaft.
2. Depth of shaft.
3. Quantity and magnitude of plant at the surface.
4. Whether an air compressor and fittings or electric lighting is to be employed.
5. Possibilities for ventilation, and the underground conditions which limit the economic length of haul. This is governed by the size of excavation, the capacity of cars, the width of tunnel and its suitability for single or double tracking.

For very small tunnels the shafts should be fairly close together. This will eliminate expensive machinery and other overhead expenses. A horse may be used for hoisting purposes, thus cutting out the expenses of a skilled hoistrunner, coal and investment in hoist. For larger excavation a steam, electric or gasoline hoist is necessary, and in very large work, where shafts may be spaced long distances apart, an elaborate equipment in the way of hoisting, lighting and pumping apparatus is both advisable and economical. Beginning therefore in the headings we may follow all the operations to the completion of the lining of the tunnel.

Since the speed in each shaft with its two drifts depends primarily on the number of miners, it is best to provide as many miners as can work properly together. The proper number of miners working in one heading is about as follows:

For openings less than 4 ft. wide, 1 miner.
For openings from 4 ft. to 7 ft. wide, 2 miners.
For openings from 7 ft. to 9 ft. wide, 3 miners.
For openings from 9 ft. to 13 ft. wide, 4 or 5.
For openings from 13 ft. to 20 ft. wide, 8 to 12.

After the opening becomes over 13 feet high, the excavation may be taken out in two benches with a gang of miners on each.

This method was followed in the Cleveland Intercepting Sewer and the top and bottom bench were taken out so that the whole face was kept a vertical plane—a method of operation which was made necessary on account of the softness and moist nature of the clay which required that the excavation be done under compressed air and the use of a shield. Whether air is necessary or not it is always advisable to take the excavation out to a single face each shift so that the lining may follow closely behind and thus avoid to a large extent a possible heavy expense in timbering.

It is curious in regard to his methods, that a miner is seldom an all-round miner. A miner of clay is usually of no use in rock work, and, generally speaking, a miner is accustomed to the use of but one tool and is at a great disadvantage when he meets with different hardness of material from that which he has previously been excavating. In Detroit, for instance, the clay is suitable for the use of grabs; in Cleveland, draw-knives are used; in Toronto, the clay varies so that all classes of tools, including picks and spades, have been used successfully.

Where the clay is soft enough, the most economical method of mining is with a draw-knife. This is a U-shaped tool with sharp edge and two stout handles. It is drawn across the face of the excavation by the miners. If the clay is very soft two men work on each tool. If harder, three and sometimes four men take hold. The effect is to slice away a long strip of clay of a size of a man's leg. This is thrown into the muck car without further breaking up and conveyed to the surface. This method results in rapid progress and in some cases each miner removes up to eight or ten and even twelve cubic yards. With the use of individual tools the performance is much less, especially in stiff material.

Excavation in Tunnel

Behind the miners are the muckers, and their number should be so adjusted as to keep the muck away from the miners at all times. If the tunnel is small the car is pushed to the shaft by a laborer, especially when the distances between shafts are moderate. If of fair size, with greater distances between shafts, mules are usually a part of the equipment for the purpose. After the excavated material is drawn to the shaft and hoisted to the top, either on a lift of by means of a cable, it is wheeled to be dumped into the wagons or cars in waiting. For this reason the dumping platform is usually eight or ten feet above the ground level. This distance is more if the muck is dumped into a storage hopper pending the arrival of conveyances to take it away. Its disposal after this is entirely a matter of local circumstances and will not be dwelt upon. Timbering of some sort is usually both necessary and wise, and frequently it may be all removed prior to lining. The work of placing the timbering is performed by experienced timbermen or by the miners.

Following closely upon the excavation should come the lining, which is either brick or concrete. If brick work is employed it is probably best to follow up the day shift of miners. This night force of bricklayers is of course dependent upon the linear progress of excavation and should be so proportioned.

From both contractors' and engineers' standpoint and for the sake of appearances and the quality of the work, it is advisable to lay up the brick in as long a length as possible at one time. In consequence it is frequently the practice when the material will stand up safely, to allow the mining to proceed for two shifts, for each shift of brick laying. By thus concentrating the operations of the brick-laying gang, a reduced force of helpers, mortar mixers and hoist runners is the result.

The invert is always laid up to line attached to the finished brickwork at one end and to the profile at the other end of the stretch. The arch is laid upon either drums or lagging, depending on the length of the stretch. Usually the profiles or lagging is set either by the carpenter or the miners, prior to the commencement of the brick-laying, so that when the bricklayers come down everything is in complete readiness for them to commence laying up brick.

A Variable Factor in Estimating

The quantity of brickwork which can be laid up by one man is one of the most variable factors to be reckoned in estimating a job of this character. Strangely enough it is found to be fairly uniform in each city, but in some places a bricklayer's performance is much larger than in others. In American cities, and particularly in Chicago, the wages paid to skilled labor are very high and the performance expected is much greater than in such a city as Toronto. While the general standard demanded in the latter city is perhaps higher than that required across the border, it does not seem as if a variation between 1000 and 3000 brick per man per shift can be wholly accounted for by the difference in standards demanded by the specifications.

Very frequently a certain definite "stunt" is laid out for the shift, and after that is finished, the workmen go home, getting their full time regardless of the actual period of time worked. Often, too, a cash bonus is given, based either upon the number of linear feet or yardage done, or upon the actual number of bricks laid, over a set minimum. Generally speaking the bonus idea properly applied to all the operations concerned in tunnel work is usually of considerable profit and advantage to the contractor as well as to the workman.

If the lining is to be formed of mass concrete a greater range of choice may be had in the manner of its construction. The invert first constructed, if the tunnel is horse-shoe shaped, may be screeded and trowelled; if circular, it is decidedly best, when grade is an important factor, to lay the middle portion of the invert to the screeds, and upon this rest the form for the upper portion. If this is not done there is a tendency towards imperfection in the work amounting sometimes to merely a few small voids, but occasionally the buoyancy of the concrete is found to have raised the form bodily, with the inevitable result of an objectionable shifting of grade and alignment. On this account, many designers prefer to involve additional expense in demanding that the concrete in the invert be used merely as a backing and that it be faced with brickwork, in order to be certain of a uniform interior surface. Occasionally, too, the intrados of the arch is lined with one course of brickwork for facility in construction or waterproofing.

The employment of plain or reinforced concrete blocks in the tunnel lining, particularly above the springing line, is now met with occasionally, and the method of placing them depends altogether on the sizes in which they are furnished. The general principles of organization, however, are equally applicable to concrete block and to brickwork.

Concreting in tunnel is a more lengthy process, and forms left in place may seriously interfere with operations in advance of these. This in turn necessitates the operating of more shafts at a time, so that the relative economy of concrete and brick work is not to be based alone on prices of materials and the wages of bricklayers and laborers.

Care must be taken in concrete arch work to see that the roof of the excavation is firm or properly timbered and that sufficient timbering be left in to eliminate the possibility of the dropping of masses of earth into the fresh work during the placing of the concrete. On this account the arch should be turned with the greatest possible speed after it has been started. The concrete should be a wet mix up to the crown; for the crown, a mix of drier consistency is necessary to make the closure. It should be thoroughly rammed in order to fill every void. Timbers left in should be outside the designed neat section and in order to secure a most economical result the timbering is sometimes constructed entirely of heavy lagging set to radius without other support of any kind. The writer recalls one work in which the timbering was 6 in. x 6 in. pieces about 2 feet long. These were sawn to the proper radius and were so laid up that they supplanted the outer course of brickwork, a method of timbering and lining both serviceable and economical since a thousand feet of lumber occupies about three cubic yards of space.

After the lining is placed and set up the forms are struck. The arch, if of brickwork, should be repointed where necessary, and the invert cleaned of all droppings of cement from above. This should be done as the work progresses, for if left until the end of the job it is an appalling task.

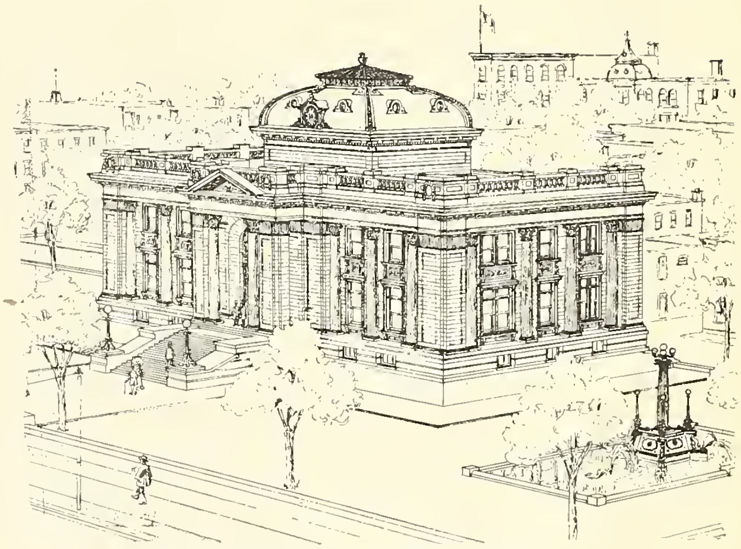
The same method of excavating and lining is continued indefinitely until the headings meet. The lining is then connected up and the pigeon-hole bricked in. Shafts are filled in or bricked up and the gangs moved into a new shaft already prepared for them, and the work goes on until all the headings are met and the disjointed sections are united into a continuous structure.

The cutting and wearing power of a stream of blown sand, long since ultilized for various purposes, has been employed for testing building materials at the Gross-Lichterfelde institute in Germany. Granite, pine wood, linoleum, and other substances used in the construction and furnishing of buildings are subjected for about two minutes to the action of a blast of fine quartz sand, under a pressure of two atmospheres. The results show the resisting powers of the substances tested to the effects of wear. This form of test is applicable to road building materials.

An oil-engine driven ship has crossed the Atlantic from the Tyne, England, to Halifax, N.S., where it arrived Sept. 22, according to a report published in "Engineering." This vessel , the "Toiler," is given the credit of being the first of its kind to complete a trans-Atlantic voyage. The "Toiler" is not intended, however, for regular trans-Atlantic service, being destined for use on canals in Canada. The vessel has twin propellers driven by two-cycle reversible Diesel engines built by the Aktiebolaget Diesels Motorer, of Stockholm. The ship itself was built by Swan, Hunted & Wigham Richardson, Limited, an English company. The fuel consumption for the trip is claimed to have been less than two tons of crude oil per day, against about eight tons of coal for a steamship of equal power.

Maisonneuve Town Hall

Designed by Mr. C. Dufort, architect, Montreal, the Town Hall of Maisonneuve, a suburb of Montreal, is 93 ft. 6 in. by 51 feet 4 inches. It stands on a concrete foundation, and is constructed of limestone on three sides and of buff brick in the rear. The building consists of a sub-basement, ground floor, and first floor, all laid out for municipal purposes. In the sub-basement the offices of the health department, superintendent of roads, and the Recorders' Court will be situated; the ground floor will be occupied by the mayor's room, secretary treasurer's and other departments, and the first floor will be the council hall. The interior fittings are of dark oak, while the stairs are of forged iron and marble. The inside painting is of ivory shade, and the pilasters are gold finished,—a feature being a series of columns in imitation marble. In the sub-basement the flooring is of Terrano, on the ground floor of French mosaic, and on the next floor of French tile. The floors are supported by steel work on which is placed Siegwart reinforced concrete. The lighting is by electricity. Mr. M. Dufresne, the town engineer, supervised the construction on behalf of the council.



New Town Hall at Maisonneuve, Que.

Frank R. Lander, County Engineer, of Cuyahoga, Ohio, who is an active supporter of brick as the material par excellence for street paving, sends us a map showing the brick roads of Cuyahoga county outside of the city of Cleveland. These roads total approximately 300 miles in length and make what is probably the best showing of brick pavements to be found in the United States.

Municipal Accounting and Efficiency

Correct Balance Sheets Do Not Mean Efficiency—Unit Costs the Test — Standards of Comparison—Scientific Budget Making

By Herbert R. Sands, L. L. B., C. P. A.,
Director of the Chicago Bureau of Public Efficiency.

Just as a mercantile concern outgrows its plant, so does a city. The difference lies in the fact that private concerns meet their needs much more quickly with additional or other facilities. For example, in this day of keen commercial competition, a private concern that did not install modern, scientific accounting methods showing costs of production, costs of sales, etc., could not long survive.

If municipal corporations could produce profit and loss accounts and were dependent for their continuance on keeping the balance on the profit side of the account, how long do you think some of our cities would endure? They would have long since been bankrupt. Measured by results accomplished, some cities are almost bankrupt now, although they may not realize it. That they are not financially bankrupt is due to the fact that our city treasuries are replenished each year by tax collections, regardless of whether the results obtained with the taxes of the previous year be good or bad.

Crediting the Account with Results

There is a wide variance in the degree of clearness with which the various municipalities make known to the public each year the results accomplished with the money expended. In order to administer efficiently, the administrator must have sufficient and reliable information clearly set forth in such form as to meet his needs. In order to elect efficient administrative officials the public must also be supplied with sufficient and reliable information, clearly set forth in such form as to meet its needs.

Let us suppose that the mayor of each city opened a ledger account at the beginning of next year with each of his cabinet officers, and that he debited each account with the amount of appropriation allowed the respective cabinet officers in the annual budget; also that he credited each account at the end of the year with the results actually produced by the respective officials with the money allowed them. Let us suppose, further, that these accounts were set forth on charts, and that these charts not only were published and circulated widely in printed form, but were placed on permanent exhibition each year in the public libraries of the respective cities or in a room of the city hall. It is within probabilities that a competition for results would soon develop between corresponding departments of different cities which would approximate closely the competition in commercial business.

Why should there not be strife and competition between corresponding departments of different cities for results? For example, why do the people of one city pay twice as much per yard for a certain kind of pavement as the people of another city, and why do the people of the second city pay twice as much per square yard for cleaning pavement as the people of the first city? Why does one city pay twice as much for cleaning each sewer basin as another city? The main reason is that neither the administrative officials nor the public have been supplied with adequate information as to actual results and costs and what the costs should be.

Unit Costs

The late Edward H. Harriman may be best remembered by posterity for his advocacy of the principle of ton mile cost and his application of the principle to our present-day need for government per ton mile. Although many cities have recently installed new and better accounting systems, even the new systems have thus far fallen short of producing the results which logically should have been expected.

Municipal accountants have indulged in long discussions as to the proper form of a municipal balance sheet and as to whether a city should produce a balance sheet at all, and attention has thus been diverted from the real vital defect in present municipal accounting methods. In short, although most of the systems in use might be extended for the production of unit cost, comparatively few unit costs have actually been produced. What the administrative official needs to know and what the taxpayer needs to know at the end of each year is what was the cost per square yard of the different kinds of pavement laid, the cost per square yard of cleaning the different kinds of pavement, per cubic foot of garbage removed, per hospital patient day, per gallon of water pumped, per inspection of water meters read, etc.

The trouble has been, and is, that such cities as do produce unit costs have no standard basis for comparison. There has been little or no standardization of municipal costs. Although the unit cost of a given function or activity may be less than the corresponding unit cost to another city of about the same size, the comparison may be of little value because the costs of the first city are excessive.

Has your city ever laid a block of pavement under conditions which would constitute a test, to determine for future guidance what should be the proper cost thereof? Has your city ever had a street-cleaning expert study the methods under which you are cleaning streets as a means of determining which is the cheapest and also least harmful to the health of people on the street and least destructive to the pavement? Has your city ever supervised with a stop watch its sewer construction gangs, catch basin cleaners or other labor gangs, as a means for determining a proper cost for such work? Just as efficient administration is dependent on keeping down the cost per unit, so the value of unit cost is dependent upon a standardization thereof.

It may be claimed by some that the development of unit costs is more of a statistical than an accounting function, but I submit that for purposes of practical administration the line of demarcation between the two is immaterial. Cost keeping is of little value until it is reduced to a unit basis. It is well to make this distinction, however, that, while auditing and appropriation accounting should usually be a function of the central financial office such as that of the comptroller or auditor, the keeping of cost records except in small cities may best be delegated to the respective departments.

Scientific Budget Making

This brings us to the second essential in efficient municipal accounting, namely, scientific budget making. Although unit costs may be developed irrespective of the form of budget, the reduction of such costs may be greatly aided by having budgetary control over the expenditures. Budgetary control is only possible after the adoption of a scientifically constructed budget. The basic trouble with municipal budgets has been that large sums were allowed for a group of different functions or activities. Budget estimates have not been constructed with the light of particular needs for particular purposes.

Until a definite amount is specified in the budget for each municipal function for which money is to be expended there can be no assurance that such an amount will not be exceeded in actual administration, or, on the other hand, used for a purpose entirely different from that for which it was originally requested; and until a definite amount is allowed for each object, such as salary and wages, supplies, repairs, etc., there can be no assurance that the amounts requested are not excessive. Department heads usually submit their budget estimate upon the basis of what was allowed them the previous year, instead of upon the basis of actual needs. They usually ask for more than is needed. because they know from experience that their estimates will be reduced by officials who subsequently pass judgment thereon. Another argument in favor of a segregated budget. therefore, is that arbitrary reductions from and additions to the estimates are made more difficult. When an official requests a stated amount of appropriation and specifies in detail the functions as well as the objects for which the appropriation is needed, the official adding to or deducting from such amount subsequently must of necessity give the public equally good or better reason for making the change.

Until two years ago the city of Chicago was operating under a budget which contained many lump sums of large amounts. It was not segregated according to functions. Department heads were allowed great freedom to group their estimates under such titles as might seem desirable. The nomenclature and grouping of the accounts were such that consideration could not be given understandingly either on the part of the comptroller to whom the estimates were submitted by department heads or on the part of the finance committee of the council. Although each item was scanned by these officials in their effort to reduce the aggregate amount of the budget, the lack of information was such that the reductions were necessarily made more or less arbitrarily.

Many examples might be cited of the lack of definiteness in the Chicago budget before the new methods were adopted, but I will mention only one, which is also sufficiently illustrative of the budgets of many other cities to-day. In the police department $205,000 was appropriated in the 1909 budget under the following title:

For repairs and renewals of wagons and harness. replacement and keep of live stock identification, police telegraph expenses, rents, repairs and renewals of equipment, hospital service, printing and stationery, secret service, light and heat and twenty-five more horses and equipment for mounted police and for repair of Hyde Park station; also other miscellaneous expenses.

Under such an appropriation title the money appropriated might be used for almost any conceivable purpose. While such procedure is common in private business, the conditions incident to the administration of public funds demand different treatment. With no basis for real control in the comptroller's office, power thus placed in the hands of those charged with administering such appropriations might be used either as a reward or a club in building up grateful constituencies against election time. With no limitation as to objects of expenditure, the entire amount might be used for payroll purposes or, by being used for supplies, diverted into the hands of influential tradesmen. When a city passes an illogical appropriation bill it puts a premium on maladministration.

As a result of the study which the Merriam Commission made of the Chicago budget, the city council adopted in January, 1910, budget methods which I believe to be the most scientific of any thus far advanced.

The budget of a city is the principal instrument of financial control over its expenditures. In order that there might be a proper basis for such control over the expenditures of the city of Chicago, and in order that there might be available at all times to the administrative officials reliable information relative to each function and activity of the city. not only as to expenditures for the several classes of supplies, but also for the several kinds of services rendered, and for other objects of appropriation, the Chicago budget was first standardized.

Standardizing a budget is to adopt a definite number of appropriation titles about the meaning and interpretation of which there can be no doubt, and which are common to most of the city departments and offices. The phraseology of these titles should not be changed from year to year, and they should be uniform throughout all of the city departments. These uniform appropriation titles are therefore recognized as standard, and when set up on the appropriation ledger are known as standard accounts. Every dollar requested in budget estimates must, after the adoption of a standardized budget, be requested under one or more of the standard accounts. Each function or activity for which appropriation is made should embrace as many of the standard accounts as may be necessary. The items chargeable against each account, such as the several kinds of supplies. materials, services, etc., should be listed in a printed pamphlet. This pamphlet should be used not only as a basis for requisition against the particular accounts, but also as a basis for audit of the subsequent liabilities against the accounts.

After a careful study of the expenditures of the city of Chicago it was found that they naturally fell within eighteen classifications. These were therefore adopted as standard accounts and are as follows:

Operation and Maintenance (Ordinary)

A Salaries and Wages.
B Hire of Teams, Horses and Carts.
C General Supplies.
D Materials for Repairs and Replacements by Departmental Labor.
E Repairs and Replacements by Contract or Open Order.
F Apparatus, Machinery, Vehicles. etc.
G Purchase of Furniture and Fittings.
H Printing and Stationery.
I Advertising.
J Street Car Transportation.
K Rents.
L Fuel and Power.
M Purchase of Horses.
N Forage, Shoeing and Boarding Horses.
O Special Contract Obligations.
P Interest.
S All Other Operation and Maintenance.

Outlays for Permanent Facilities (Extraordinary)

X All Construction and Betterments.

It will be noted that each standard account is designated by a code letter. Each department or office is designated by a code number. These code designations are placed at the left of each appropriation account in the original budget and remain unchanged throughout the year. In fact, they had best be separately adopted by ordinance as a part of the municipal code. Each item on the schedule of commodities and services already referred to also bears a code number. The adoption of such a scheme of codification not only facilitates references and reduces the clerical labor of repeatedly writing appropriation titles upon requisitions, orders, warrants, etc., but also lays the basis for a tabulation by departments, functions and sub-functions of the cost of each kind of supply, material, service, etc., during any period desired. The value of such statistics is obvious.

Under such a scheme also, tabulations may be made mechanically, at a moderate cost, by using the code designations to transfer the information on invoices to punched holes in cards and tabulating the latter on electric tabulating machines.

It is always desirable that the budget be passed each year not later than the last quarter of the preceding year. requests made by the mayor or comptroller of department heads for their estimates of amounts needed should be made in the form of uniform questions corresponding to standard accounts, and answers thereto should be required to be prepared and submitted on uniform blanks. It should be required that these blanks be filled in and returned to the mayor or comptroller sufficiently in advance of the date when the appropriating body is required to pass judgment on the estimates that the fullest publicity may be given thereto.

It is recognized that even with the most scientific methods of budget making it will always be impossible to foresee all of the contingencies which may arise during a year which will demand appropriations. Experiences shows, however, that such demands may usually be met by making transfers between accounts. In this respect budgets should be flexible, but such transfers as become necessary should be requested formally from the appropriating body, sufficiently in advance to allow of their publication in the printed proceedings. All transfers should be given the light of publicity as fully as the amounts originally allowed. A clause should, therefore, be inserted in the appropriation bill that no transfers may be allowed except upon the recommendation of the comptroller or auditor to the finance committee and over a statement by him that he has carefully investigated the conditions in each case. It avails nothing to vote money for what the public desires, if it can be subsequently used for other purposes.

Need for "Mayor's Eye"

I wish to emphasize at this point the valuable service which may be rendered a city, not only in preparation of the annual budget, but in securing better efficiency all along the line by what we may term "The Mayor's Eye." I have in mind a small expert staff responsible directly to the mayor and designed to assist him in securing effective administration.

As a permanent staff only two men are necessary, one a municipal accountant and the other a municipal engineer, but both should be specially trained in efficiency work. This small staff may serve as a nucleus and be augmented by additional expert help as occasion demands. It is needless to say that the selection of this staff should be entirely separate and distinct from political affiliations, and it may be advisable to make their employment an exception to the civil service requirements. Moreover, in the employment of such investigating and advisory experts, executive officials should not hesitate to go beyond the confines of their own city.

The City of New York, after the Tweed scandals, organized such a "Mayor's Eye." It is called the office of the Commissioners of Accounts, there being two commissioners, one a certified public accountant and the other an engineer. Owing to the enoromus growth of New York and the complicated problems incident to consolidation of the several boroughs, a much larger staff has been attached to this office than would otherwise be necessary. I will cite two of the recent benefits secured by these representatives of New York's mayor: A new tuberculosis hospital was designed for erection on Staten Island at a cost of $3,500,000. A review of the plans by the commissioner of accounts resulted in reducing the cost of the hospital a million dollars. An investigation of the business methods incident to the operation of the municipal ferries of New York resulted in increasing the revenues therefrom by $175,000 a year, while the investigation cost only $10,000.

The Boston finance commission partakes somewhat of the same nature. Among other economies secured by this commission was their discovery that the municipal stone crushers of Boston, instead of being an economy, were a luxury. The commission recommended their discontinuance, and as a result $250,000 was saved on crushed stone in the next two years. After studying the methods used in cleaning sewer basins, this commission recommended a change to the contract system. with a resulting reduction of over forty per cent. of the former cost.

The Milwaukee Bureau of Economy and Efficiency is another "Mayor's Eye." By promoting the use of a municipal refuse incinerator it is expected that $64,000 a year will be saved to the taxpayers of Milwaukee.

Comptroller Taussig, of St. Louis, recently secured an allowance from the appropriation body of St. Louis for the purpose of enabling him to do efficiency work in the city departments there. He employed an expert from another city and paid him $25 a day. There was some protest on the part of local politicians, but the first week this expert was on the job he pointed out to the comptroller how $50,000 might be added to the revenues of the water department by having some of the clerks in the office of that department go outside during the dull season and make reinspection of buildings.

Municipal Scientific Management

The Cincinnati Bureau of Municipal Research, in a letter to Mayor Schwab, has suggested that he appoint a committee, of either officials or non-office-holding citizens, to systematically study the various branches of municipal service, giving special attention to:

1. Study of labor efficiency; establishment of standards of work that should be done by different classes of employees; introduction of efficiency reports measuring, so far as possible, the work of employees, and facilitating comparison with standards.
2. Introduction of expense accounts and reports, which would enable the Mayor and his officials to receive accurate monthly statements of costs of operation, as a guide to administration. As far as possible, it would be desirable to show unit costs.
3. Introduction of systematic monthly reports to the Mayor by each department in a form to show, as far as possible, the amount of work done of each kind.
4. Promotion of economy in purchasing, by standardization of supplies and specifications, purchasing in large quantities, etc.
5. Study of methods of inspecting supplies, materials and repairs.
6. Study of methods of controlling the storage, distribution and use of the city's supplies.
7. Study of methods of accounting control over revenues and amounts owed to the city.
8. Comparative study of unit costs of maintenance of horses, automobiles, buildings, etc.
9. Wherever possible, comparative studies of unit costs in the several departments, such as cost per square yard of street repairs, etc.

Under the head of New Business Openings, "Western Progress" draws attention to the need for a brick plant at Yorkton, Sask., a thriving town which is making rapid progress. An architect is also assured of a living if he will open an office at Yorkton. Inquiries should be addressed to Mr. G. H. Bradbrook, Secretary Board of Trade, Yorkton, Sask.

Tar-Concrete Paving in Ontario Cities

A History which began with Experimental Work in Hamilton some Thirty Years Ago — Conclusions from the Author's Experience*

By W. A. MacLean, Provincial Engineer of Highways for Ontario

Tar-concrete, or more popularly, "tar-macadam" pavements, have been in service in several cities of Ontario for a number of years, and the history of the earlier of these, while not accompanied by all desirable data, presents features of interest, in view of the growing use of bituminous materials for country highways.

From time to time reference has been made in the technical press to the tar-concrete pavements of Hamilton, Ont., and it is the purpose of this paper to include also the experience of Toronto, Ottawa, London and other cities. In all cases, the pavements have been laid by the mixing process, and coal gas tar (supposedly) was employed.

The beginning of tar-concrete roadways in Ontario was in the year 1880, when the Gas Company of Hamilton laid a short section (Mulberry street), about 1,300 square yards, in that city. No further work of this class was done until 1891, when the same company laid 2,983 square yards at a contract price of $1.50 per yard; and in 1893 another area of 3,768 square yards was laid at a contract price of $1.75 per yard. Experience with these roadways was such that, in 1899 a considerable extent of old cedar block pavement needed renewal, "tar macadam" was selected, and about ten miles of roadway were built of that material.

Hamilton

The following is the specification under which the later pavements (since 1899) were laid in Hamilton:

(1) "All earth or other material above the subgrade shall be excavated, so as to conform to the level of the subgrade, which will be twelve inches below the finished surface of the roadway; and should the subgrade be above the level of the natural ground, then earth shall be deposited until the level of the subgrade is reached. The subgrade shall be shaped to the profile and cross-section which will be furnished by the city engineer.

(2) "After the subgrade has been formed to the proper camber of the road. generally one-half inch per foot, or six inches for a 24-foot roadway, to be thoroughly rolled with the steam roller, and if by this means soft spots are revealed, they shall be filled with good solid material.

(3) "The first six inches shall be made in the ordinary way for a macadam or Telford roadway thoroughly rolled. If so required it may be made of hard broken stone, furnace clinkers, or brick rolled smooth and finished to the required camber of the road. Upon this shall be placed the tarred stone. The first layer, three inches of hand-broken stone, the whole smoothed off with a hand roller, and after top dressing is applied, thoroughly rolled with a steam roller. On this a layer of fine gravel and quarry clippings, mixed in equal proportions, three-quarters inch thick, shall be placed, and well rolled in so as to fill all interstices. Before finishing, a dressing of stone screenings, for the purpose of coloring, shall be scattered broadcast to be worked in by the traffic. All layers, including the coloring layer, shall be thoroughly compacted by rolling.

(4) "The stone to be tarred shall, if moist, be heated on an iron floor, under which are flues from a fire, until the moisture is driven out. The material in its heated state is then thoroughly mixed with a sufficient quantity of tar. The broken stone in warm weather may be sun-dried, but in all cases the finer course must be artificially dried. At the same time care must be taken not to get this material too hot. The tar should be boiled in iron kettles holding one hundred imperial gallons. Eight imperial gallons should be added to each cubic yard of the coarser material, or more if required to completely cover the stone, and seventeen to eighteen gallons to the finer kind of stone.

(5) "The tar must be pure coal tar free from all foreign substances, and containing not more than five per cent. of water, and shall contain upon analysis not less than fifty-six per cent. pitch.

(6) "The work must be done in the summer months, and all work must be suspended during wet weather."

The tar-concrete was used to replace cedar block pavement, and the preliminary work consisted in the removal of the old cedar blocks. As these were ten inches in depth, it was necessary to remove two inches of sand upon which they were placed, to make room for the twelve inches of macadam, and bring it to the proper elevation with respect to the curb.

The cedar blocks and surplus sand having been removed, the subgrade was thoroughly rolled with a fifteen-ton steam roller.

Care was taken in forming the subgrade, and in laying each layer of stone, to bring the surface in each case parallel to the finished crown of the roadway. The first six inch foundation course, referred to in Section 3 of the specification, was made up of flat stones, from 6 to 12 inches in greatest dimension, laid roughly by hand on their natural beds. On this, smaller stones were placed and broken into the interstices, so as to keep the bottom course in place.

The next two courses of tarred stone were then applied. Large kettles were hung close to the work. and in them, the tar was kept at a workable temperature. Convenient to the kettles, the stone to be tarred was placed on mixing boards. With a dipper attached to a wooden handle, the tar was then applied to the stone, being scattered over it by a swinging motion of the dipper.

With shovels kept hot to facilitate the work, the stone was turned over twice after the first application of tar. More tar was then scattered over the stone, and the stone was again turned over. These operations of tarring and turning the stone were repeated until each stone was seen to have a coating of tar, there being no bare spots on the stone. One part of tar to twenty-two parts of stone was specified for this course.

As soon as the stone had been tarred, it was shovelled into wheelbarrows, placed on the road to the desired depth. and raked to the required cross-section. It was found of advantage to roll the tarred stone immediately after being placed on the road, since if left two or three days it would not consolidate as perfectly.

The top course of fine tarred gravel was mixed in the proportion of about twenty gallons of tar to one cubic yard of gravel; or one part of tar to eight or nine parts of gravel. The gravel, before mixing, was screened through a three-quarter inch mesh. This material was prepared in an asphalt mixer, being brought hot to the road, and carefully raked to the required grade and cross-section. This having been rolled, stone screenings from the crusher were scattered over the surface to harden it, and improve the appearance.

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* A Paper, entitled, "History of Tar-Concrete Pavements in Ontario," read at the Washington Convention of the American Association for the Advancement of Science, December 30, 1911.

The cost of the various pavements varied considerably. In 1899 the average was about 79 cents a square yard, but labor then cost 15 cents an hour, and coal tar f.o.b. Hamilton $2.60 per barrel (50 U. S. gallons). The average in 1900 advanced to about 88 cents a square yard; with labor at 17 cents an hour and coal tar at $3.75 a barrel. With the advancing cost of labor and materials the cost in 1901 averaged nearly $1.08 per square yard, exclusive of curb—about 30 cents per yard more than in 1899. Plain macadam laid in 1901 averaged 53 cents a square yard.

None of the pavements were constructed by contract, all work being done by corporation labor. The stone used was a hard limestone quarried within the city limits, the average haul to the work being one and one-half miles.

Toronto

Following the experience of Hamilton, the city of Toronto in 1900 laid an experimental tar-concrete roadway on Woolsley street, of three blocks, or approximately a quarter of a mile in length. This roadway did not have the heavy foundation characteristic of the Hamilton pavements, but after the subgrade had been carefully prepared and rolled, a course of broken limestone 4-in. in thickness, was spread. This consisted of stone not less than 1¾-in. in length or breadth. This was filled with sand, was flushed, and thoroughly rolled. On this course was spread a layer of tarred stone, which was required to be as uniform in size as possible, and not less than 1½-in. or more than 2-in. in size. This surface was evenly raked and rolled. Then a layer of ¾-in. in thickness of fine granite chips thoroughly tarred, was evenly spread over the whole surface and rolled. Before finishing, a dressing of ½-in. in thickness of approved pea gravel was spread over the entire surface of the roadway, to be work in by traffic. The specifications for mixing tar were very similar to those employed in Hamilton. Additional pavements were laid in 1901 and 1902. For two or three years these pavements were most favorably regarded as being smooth, noiseless, sanitary and dustless, but in 1903 marked signs of disintegration began to appear, and under specifications prepared for 1904 it was then provided that there should be a foundation course five inches in thickness. The intermediate course of tarred stone was eliminated, and a wearing surface three inches in thickness was provided. Three sizes of broken stone were used in this tarred surface, viz., 1½-in., ½-in. and screenings. A mixture of these three sizes of stone in the proportion of two parts of 1½-in. stone, one part of ½-in. stone, and one part of screenings, was found to give a dense aggregate. During the period 1900 to 1906 there were laid in all 7.16 miles of tar macadam roadway on the streets of Toronto.

Work carried on in 1905 required a foundation course five inches in thickness after rolling, this to be of coarsely broken stone, the surface interstices to be filled with 1½-in. stone, and covered with a layer of hot bitumen, using not less than one gallon per square yard. The specification provided that:

"Upon the above foundation course is to be laid a surface thoroughly saturated with the bituminous composition. This course shall be composed of good, hard and tough limestone, samples of which must be approved by the engineer before any is delivered on the ground, and shall be equal as to quality, size and fineness to the samples which may be seen in the office of the City Engineer.

"Of this mineral aggregate,

"(1) Thirty per cent. shall be such as will pass a No. 40 sieve.

"(2) Twelve per cent. shall be such as will be held on a No. 40 sieve and pass a No. 8 sieve.

"(3) Ten per cent. shall be such as shall be held on a No. 8 sieve and pass a No. 4 sieve.

"(4) Eighteen per cent. shall be such as shall be held on a No. 4 sieve and pass a one-half inch sieve.

"(5) Thirty per cent. shall be such as shall be held on a ½-in. sieve and pass a ¾-in. sieve.

"These different sizes of stone shall be heated to a temperature of at least 225 degrees Fahrenheit and not to exceed 275 degrees Fahrenheit. The No. 1, 2, 3 sizes of stone shall then be measured in accurate proportions by volume, and thoroughly mixed with a twin-pug or other mechanical mixer, the previously prepared mixture of tar and pitch shall then be added together with sizes No. 4, No. 5 of the broken stone, and the whole mass mixed until the stone dust has become saturated with the mixture of tar and pitch, and is thoroughly mixed through the whole mass, and has a uniformly black appearance.

"This aggregate shall then be spread over the entire road way to the required depth so as to produce a thickness of not less than three (3) inches after being rolled and consolidated. The surface shall be evenly raked, rolled, repaired, brought fully up to grade and true to cross section wherever required and then re-rolled until firm, compact and true.

"A flush coat of California Asphalt, Oxygenized Asphaltum or other equally good and suitable asphalt, in the engineer's opinion, having a melting point of about 170 degrees Fahrenheit, shall be flushed over the entire surface at a temperature of at least 250 degrees Fahrenheit, so as to fill all interstices, and present a smooth, perfectly unbroken surface. A sufficient layer of good approved limestone chips, no particle of which shall be more than one-half inch in greatest dimension, shall then be spread over the whole surface and thoroughly rolled. More limestone chips shal be added where and as required from time to time, as the rolling progresses so that the whole surface is completely and evenly covered with a uniform coating of limestone dust when finished, of not less than one-eighth of an inch, nor more than one-quarter of an inch in thickness after rolling has ceased.

"On commencing work a measured quantity of tar and any quantity of pitch shall be heated in separate kettles of at least one hundred imperial gallons capacity. When the pitch is melted a sufficient quantity shall be added to the heated tar to make a mixture as previously determined by laboratory tests from time to time, and the whole (constantly agitated to ensure a perfectly uniform mixture) ready for use. As more is needed measured quantities of melted pitch and tar are added in the proportions which shall be determined by laboratory test, and brought to a temperature of at least 200 degrees Fahrenheit, and not to exceed 250 degrees Fahrenheit. Reliable thermometers shall be used to determine temperatures.

"Paving pitch to have the following characteristics: Tenacious, not relatively brittle at ordinary temperatures, insoluble in water, specific gravity of about 1,150, and have a melting point not under 200 degrees Fahrenheit.

Tar is to be coal gas tar, should be quite thick at 70 degrees Fahr., have a specific gravity of 1,200, and be entirely free from water and the lighter hydrocarbons. To ensure the above characteristics, the crude tar should be previously heated to 250 degrees Fahr.

"Tar that has been refined to the desired consistency may be substituted for the mixture of tar and pitch specified. This refined tar shall have the following characteristics: Tenacious, insoluble in water, fill carbonaceous matter soluble in ordinary tar menstrua, free from water and the lighter hydrocarbons. It shall have a flowing point, as determined in a dry oven, of 120 degrees Fahr.. and shall be similar in consistency to the standard sample which may be obtained by the manufacturer at the City Engineer's office."

London

The City of London in the year 1900 laid a tar macadam pavement on Queen's avenue, one of the important streets of that city, of which the specification in part provided that, on the usual construction of subgrade should be laid a six-inch foundation of clean, coarse gravel, to conform with the cross-section and finished grade of the street. Upon this foundation of gravel when thoroughly rolled was then placed three inches of tarred stone capable of passing through a 2½-inch ring, twenty per cent. of which being fine crushed and capable of passing through a 1½-inch ring. This crushed stone was heated on a steel platform or pans to 120 degrees, and tar composition then poured until the stone was thoroughly covered. Tar was heated to boiling point (212 F.) and pitch to about 240 degrees, and the whole thoroughly mixed. After mixing it was placed on the street and graded evenly to the required depth, then rolled with a horse roller, after which it was rolled with a steam roller. A second course of two inches in depth of crushed tarred stone passing through a 1½-inch and 1-inch ring respectively, mixed in the same manner, was placed and rolled with a horse roller. On this second course was then spread the finishing coat, 1-inch in thickness, composed of a thorough mixture of sand, pitch and tar. The sand was thoroughly dry and heated to at least 120 degrees Fahr. This coat was applied while hot. spread evenly to the proper thickness, and rolled with horse roller, after which the whole pavement was rolled with the steam roller and sanded with dry sand one-half inch in depth. Traffic was to be kept off for a period of at least one week. Tar was to be heated to 212 Fahr. and pitch to 240 Fahr. and properly mixed in the ratio of ten gallons of tar to one gallon of pitch per cubic yard of crushed stone, and eleven gallons of tar to one of pitch per cubic yard for the top coat. Tar was required to be clear coal gas tar containing no water gas tar; the pitch also to be the best of its kind manufactured from coal gas tar.

Guelph

The city of Guelph in 1908 laid one block of tar macadam. This consists of a foundation of rough stone, eight inches in depth. On this was laid a three-inch layer of three-inch stone. Then followed a three-inch layer of 2½-in. tarred stone; then a one-inch coat of one-half inch stone tarred. Both stone and tar were heated, the hot tar being poured over the dried stone. Several other streets, aggregating 27,016 square yards have since been similarly paved. The tar is produced at the municipally owned gas works. For both coats of stone, the amount of tar used averaged 2½ gallons per square yard.

These roadways are giving satisfaction, and show very little sign of wear. In the years 1910 and 1911 concrete foundations on tar macadam roadways were found to be cheaper than stone. In laying the surface the concrete base was flushed with hot tar. The two-inch broken stone was then spread to a thickness of three inches, and rolled once or twice with a fifteen-ton roller. The stone was then sprinkled with hot tar sufficient to coat most of the stone, but not enough to fill the voids. For the surface, half-inch stone free from dust, was dried on plates and mixed on a mixing board with hot tar, then spread and rolled until well compacted.

In laying the earlier roadways the tar was boiled in ordinary tar kettles, but this method was too slow. The city now uses an old steam boiler set in brick work in the ordinary manner. The tar is emptied into the boiler from an elevated platform, and after being boiled is drawn off by a pipe from the bottom into a tank wagon. and immediately taken to the street. The only refining is by boiling. A slow fire is necessary and constant stirring to prevent boiling over. The tar is frequently tested by cooling a little in water, and the boiling is continued until the tar becomes of the desired consistency.

Ottawa

Tar concrete pavements were first laid in Ottawa in the year 1902, and the total length laid has been 5.15 miles. In construction. the roadway was excavated to the required subgrade, which was then rolled with the fifteen-ton roller if soft or loose, until thoroughly compacted. Upon this the spalls were placed to a depth of from eight to ten inches, and the top spalls broken up by hammers and made to conform to the shape of the roadway. On the spalls was placed a layer of two-inch stone, three inches thick and well rolled. The next layer consisted of a layer of two-inch tarred limestone, three inches thick, and put down while hot and rolled at once until cool. Great care was taken with this layer to see that it conformed to camber and grade in crown and gutter. The last coat or wearing surface consisted of a one-inch layer of ⅝-inch tarred limestone, laid down while hot and rolled until it presented a hard, smooth surface. This surface was then dusted over with limestone dust to fill up any interstices and render it water-tight. The amount of crown on these pavements varied according to the width from 7½ inches to 8½ inches, being reduced in amount as the longitudinal grade increased.

Chatham

One block of tar macadam was laid in 1898, but this has not been satisfactory, owing, apparently, to the surface of the tar macadam being destroyed by a coating of clay brought by the wheels of vehicles from unimproved streets. In 1910 it was sufficiently intact, however. to be used as the foundation for a bitulithic pavement.

The specifications for the tar macadam required: An excavation twelve inches below the finished grade of the pavement; an eight-inch layer of broken stone; a four-inch layer of tarred stone; a three-quarter inch layer of fine tarred surface coating.

The stone to be tarred was spread on an iron floor, under which were flues from a fire, and heated until the moisture was driven off. The stone in its heated state was then mixed thoroughly with tar. The tar was previously boiled in an iron kettle holding fifty imperial gallons. to which was added a bucketful of pitch. Eight imperial gallons were added to each cubic yard of coarse stone, and from ten to twelve gallons to the fine stone. The cost of the tar macadam was $1.25 per square yard.

Results

The tar-concrete roadways described, have been made from commercial tars. The work was principally done by day labor under corporation foremen and engineers. Reference to proprietary tar products has been purposely avoided. The writer is not personally familiar with the first tar pavements laid, but has observed construction and results in numerous cases since the year 1900. The general history of these pavements has shown much similarity. For the first three years the surface has been all that could be desired, but about the end of that period a disintegration of the top coat has commenced. At the end of five years a mottled condition has become general, where the seal coat has chipped away, exposing the coarser bed of tarred stone. At the end of ten years the surface has become generally disintegrated, but the foundation has rarely if ever broken through, and a portion of the tarred surface course remains in place. Sections of the Mulberry street pavement in Hamtham, laid in 1880, can still be seen. In no case has it been found that adequate attention has been given to the repair of these pavements by tar painting, or patching with tarred stone.

In the cities of Hamilton and Toronto, both of which have municipal asphalt plants, the tar pavements have been restored by giving a complete surface of sheet asphalt. The greater part of the tar-concrete roadways in Hamilton laid since 1899, have been treated in this way at the end of ten years, and results have been very gratifying. James street south, in Hamilton, with central lines of car tracks, has been treated in this way, and is indicative of results under heavy traffic. Dupont street in Toronto, constructed as a tar macadam in 1903, was surfaced with a coat of sheet asphalt, one inch in thickness in 1908, and the pavement is to-day (1912) in good condition. This was put on the tar macadam merely as a seal coat. A section taken from the pavement shows the tar to be in a plastic condition. The cost in Hamilton, for the asphalt surface was 75 cents a square yard, where a binder course was required; and about 45 cents a square yard where such binder course was omitted.

Under the later Toronto specifications, in which the tarred material was proportioned for greatest density of aggregate, superior results were obtained, as for example, on Hawthorne avenue, a street of light residential traffic. This street, paved in 1905, is now in excellent condition, and shows very little sign of surface disintegration.

The tar used was supposedly, in all earlier cases, the commercial coal gas product, crudely heated to drive off water and volatile oils. In every case difficulty was found in obtaining a uniform quality, and no doubt much of the disintegration was due to the use of inferior tar. In view of the fact that in English practice a desirable tar contains not over one per cent. of water, or two per cent. of volatile oil, that it shall have at least eighty per cent. of pitch, it is apparent from the specifications quoted in this paper that earlier Canadian construction was very indefinite in this regard, and permitted the use of a quality of tar not now sanctioned.

The tar pavement in Chatham is interesting from the fact that its more rapid disintegration apparently resulted from clay being tracked on from adjacent streets, and would corroborate the experience suggested by the State Highway Engineer of Maryland, that clay would appear to have an emulsifying effect on bituminous binders.

A side-light is thrown on the use of tar, by experience with foot-walks of tarred gravel. Early in the history of tar pavements, sidewalks were used, but have now been almost entirely displaced by the more durable, but less agreeable, cement concrete walks. These walks were laid by first putting down a foundation layer of gravel, which was well consolidated by pounding. On this was spread a three-inch layer of tarred gravel, well rammed, and this finally given a paint coat, and sprinkled with clean coarse sand. The tar used in the ordinary commercial gas tar, merely heated to permit mixing with sun-dried gravel. Enough tar is used to coat each particle of gravel,—about one part of tar to eight or nine parts of gravel. It is considered of primary importance to obtain a firm and unyielding foundation, and to thoroughly consolidate the tarred material. In Richmond Hill, a hamlet near Toronto, these walks, for example, were first laid in 1886; the earlier and more experimental were not a success, but others laid in 1889 are still in use. These, every two or three years, are given a paint coat of tar, gritted with clean sharp sand. Made of gravel, there is a tendency for the crown to flatten not apparent in pavements of crushed stone.

Owing largely to the reduced price of asphalt, the use of tar (other than proprietary forms of construction) has been discontinued in Hamilton and Toronto, these having municipal asphalt plants. Ottawa has stopped the use of tar for this reason, and also because of the uncertain results which have attended its use there. The city of Guelph, having a municipal gas plant, continued the construction of tar concrete roadways, using some care, however, in refining the tar to remove water and volatile oils.

Were exact data available as to the quality of material used, and variations from the prescribed specifications, numerous positive conclusions might be deduced from the tar concrete work described. Under the circumstances, while reasonably positive in certain particulars, other factors are merely suggested. It may, the writer believes, be concluded that tar of uniform quality, and of composition within certain range of proportions, while susceptible to extremes of temperatures, becoming brittle and slippery in cold weather, and soft under midsummer extremes of heat, is not debarred by climatic or other conditions, as a useful road material; that best results require a dense mixture, preferably proportioning the aggregate for maximum density, in order that internal deterioration will not occur from moisture or atmospheric action; that some doubt may be attached to the complete durability of bituminous surfaces made by the penetration process, in which density of aggregate is lacking, and suggesting that the grading of stone in this method, rather than having a uniform size, is desirable; that a moderately coarse aggregate should be brought to the surface, as far as practicable, to overcome slipperiness and take up wear; that tar-concrete is less durable under concentrated wear than is sheet asphalt, wearing rapidly when laid along street car tracks where traffic is confined to narrow lines, but is more resistant to moisture as indicated by the greater durability of tar in gutters; that broken stone will provide a more stable structure than will water-rounded gravel when bonded by tar; that a paint and grit coat is necessary as a preservative as frequently as signs of surface wear or oxidation appear; and it is probable that such treatment will add to the durability of any bituminous pavement, restoring necessary oil, and not merely repairing the worn surface but gradually increasing its thickness.

Among the most active of the contracting concerns of the Maritime Provinces during 1911 were Messrs. F. A. Ronnan & Company, of Halifax, N. S., whose work totalled approximately $176,000 in value. Among their most recent contracts may be mentioned the public wharf at Shelburne, N. S.; brick and stone school building at Halifax; concrete mill at Bedford, N. S.; brick and stone annex to the Technical College at Halifax; brick and stone annex to the Nova Scotia Hospital, Dartmouth; and a residence at Halifax for Mr. B. Moir. The company's work is carried out under the supervision of Messrs. Walter Lownds, of Halifax, and Daniel Stewart, of Shelburne, N. S. All the company's contracts are well under way. The work on the Murray Laboratory, which is an annex to the Nova Scotia Technical College, was delayed for a short time for structural steel, but this has now come to hand and is all in position; work on the building will be completed in a few weeks. The concrete foundations for the Nova Scotia Hospital at Dartmouth have been completed and building operations will be rushed early in the spring. The large wharf at Shelburne, N. S., which is being built for the Department of Public Works, is nearing completion and the contractors expect to hand it over to the government by the end of the second week in January.

Mr. Arthur St. Laurent, Deputy Minister of Public Works, and engineer in charge of the Georgian Bay ship canal, left Ottawa recently in company with Mr. Coutlee, the assistant engineer, for Panama, via New Orleans, to examine the works there and to obtain information that may be useful in connection with the Georgian Bay Canal.

A Modern Organization in Old Quebec

History and Achievements of the Builders' Exchange of that City — The Part taken in Provincial and Federal Legislation

The Builders' Exchange of the ancient and honorable city of Quebec owes its reputation, in fact its very existence, to one man,—a man who has played a remarkable, single-handed part in the organization of master builders all over the country. We refer, of course, to Mr. E. T. Nesbitt, President of the Canadian National Association of Builders, and likewise of the Quebec Builders' Exchange. Whether Mr. Nesbitt's great energy and initiative ability find full scope in old Quebec we do not know, but whenever we think of the Quebec Builders' Exchange we think of E. T. Nesbitt; on the other hand, when we think of E. T. Nesbitt we do not think of the Quebec Builders' Exchange but of the larger body, the C. N. A. B., for which Mr. Nesbitt has done such yeoman service. The Quebec Builders' Exchange was organized by Mr. Nesbitt in 1907 and incorporated in the same year. For two years Mr. Nesbitt was vice-president and for the last two years he has been president. As many of our readers are aware, Mr. Nesbitt is a contractor and builder at Quebec and is the proprietor of a large lumber business, planing mill, and sash and door factory. His operations extend all over the province. In the vicinity of Quebec this year he has erected more than a score of good-sized buildings under contract for important industrial concerns. Mr. Nesbitt is also President of the Quebec Branch of the Canadian Manufacturers' Association.

Mr. E. T. Nesbitt, Quebec
President Quebec Builders' Exchange and President Canadian National Association of Builders

Mr. Arthur Picard, of Messrs. O. Picard & Son, a Quebec plumbing and heating firm, is Vice-president of the Quebec Builders' Exchange. Mr. Picard was president of the finance committee at Quebec and is now president of the new Government technical school.

The Secretary of the Exchange is Mr. Alphonse Cote, who is rendering excellent service to the institution.

The Quebec Builders' Exchange has worked hard to improve the conditions of the local builders and supply men. Much concern was evinced in connection with the new Employers' Liability Law enacted two years ago, which came into force January 1, 1910. When this measure was up in the House, the Exchange organized a joint meeting of the Boards of Trade, Manufacturers' Associations and Builders' Exchanges of Montreal and Quebec. The meeting was held in the rooms of the Builders' Exchange at Quebec and the best legal talent was requisitioned. Clause by clause the proposed law was thrashed out until the meeting was in a position to appoint representatives to appear before the committee of the House and offer amendments, which, it is a pleasure to relate, were all accepted by the Minister and incorporated in the bill. As a consequence the Province of Quebec has to-day an indemnity law which is giving fair satisfaction to all parties. In any case the measure was a hard pill for the building interests to swallow, but it was recognized that it was to be made law and that the best course was to make it as acceptable as possible. The success encountered may be attributed to the contractors' excellent organization at Montreal and Quebec and to the characteristic energy of two or three men. It would be superfluous to mention the name of Mr. E. T. Nesbitt.

Like energy has been shown in connection with other important matters and concessions have been obtained not only from the architects but from the civic authorities and from the federal and provincial governments. By the united stand taken against the unions several clashes with labor have been avoided.

Mr. Nesbitt went up to Ottawa personally to give evidence before the special committee of the House on the eight-hour bill and received the congratulations of the Minister of Labor for his helpful evidence. He fought hard to have the bill thrown out and it is significant that it has been laid aside.

The rising importance of the Quebec Builders' Exchange among the influential bodies of the province may be estimated from the fact that the annual dinner of the Exchange, held last February, was attended by the Premier of Quebec, Sir Lomer Gouin; the Minister of Public Works, Hon. L. A. Taschereau; the Mayor of the City and the Presidents of the Board of Trade and the Canadian Manufacturers' Association.

Three years ago the Quebec Exchange affiliated with the Canadian National Association of Builders. Naturally, keen interest is taken in the work of the parent body. One might suggest that much of the enthusiasm shown by the members has been infused into them by President Nesbitt. Unprecedented interest is being taken in the forthcoming convention of the C. N. A. B., which is to open at Toronto on February 20th and which promises to be the most noteworthy gathering of the kind ever held in Canada.

The prospects of the Quebec Builders' Exchange are bright. It has got away to a good start and it is under the guidance of one of the most masterly organizers in the Canadian contracting community.

More definite arrangements have now been made for the Montreal Builders' Exchange dinner on January 9, at the Windsor Hotel. The speakers include Hon. Dr. S. Sproule, Speaker of the House of Commons; Hon. T. W. Crothers, Minister of Labor; Hon. Louis P. Pelletier, Postmaster-General, and Hon. L. A. Taschereau, Minister of Public Works and Labor, Quebec; Mayor Guerin, of Montreal; and Mr. C. C. Ballantyne, representing the Harbor Commissioners.

Busy Year for Engineers and Contractors

Satisfactory Progress During 1911 indicated by Reports received from a Number of Cities—Optimistic Forecasts for the New Year

Mr. D. McD. Campbell, City Engineer of Sydney, N. S., furnishes us the following particulars relating to the work of his department during 1911:—"With reference to street work, some 11,318 lineal feet of concrete, combined curb and gutter, and 9,950 square yards of concrete sidewalk were laid. A section (6,000 square yards) of Charlotte street was paved with asphalt macadam on a concrete base. The usual small extensions of the water mains were made, aggregating some 2,000 feet. Extensions to the sewer system were made in length about 1,000 feet. The old wooden Whitney avenue bridge was removed during the year, and a concrete culvert constructed, a fill being made to take the place of the old bridge. Up to the end of November 171 building permits were issued, representing an outlay of $486,642."

The Saskatoon Construction & Engineering Company (Harry Welch, manager), are laying a 42-in. concrete pipe for combined storm sewer and subway drain on 23rd street, Saskatoon, from First Avenue to the South Saskatchewan River. The total length is 2,204 feet, and the average depth 28½ feet, with a maximum of 31 feet and a minimum of 25 feet. The contract is mostly pick and shovel work, using hand cars in tunnels and two small travelling derricks on the surface. Shafts are sunk at intervals of not less than sixty feet or more than 160 feet. The timbering is constructed in regular mine fashion, as the material, though of Mr. Harry Welch, who expects to be kept busy with this of Mr. Harry Welch, who expects to be kept busy with this kind of work during 1912.

The work carried out by the Western Steel & Iron Company, Limited, Winnipeg, Man., during 1911, represents an approximate total value of $175,000. The company were entrusted with a large amount of architectural iron and bronze work, including contracts for such buildings as the twelve-storey McArthur building at Winnipeg; the Alloway & Champion Bank, Winnipeg; the Old Folks' Home, Portage la Prairie; Ward Seven Incinerator Plant for the City of Winnipeg, and many others. The superintendent in charge of this construction has been Mr. E. W. Woodward, formerly of the Gorman Manufacturing Company, fine metal workers, of Providence, R. I., and the Winslow Brothers' Company, architectural iron and bronze workers, Chicago. The material used was manufactured for the most part in the company's own plant. It is of interest to note that the company is contemplating the extension of its plant during 1912, although, we understand, no definite plans have yet been formulated. The only difficulty encountered by the company in the fulfilment of their contracts is that of obtaining complete details from the architects. The company attribute this difficulty in many cases to the large volume of business on hand. To offset this deficiency the company maintain a well organized drawing office in which everything is detailed before going into the shop. In this way most errors can be eliminated before the actual work of construction and erection. Mr. Hugh R. Eade, manager of the Western Steel & Iron Company, Limited, looks forward to a record season during 1912. He informs us that the prospects are exceptional and that there is a noteworthy tendency in Western Canada to build more expensive structures of a fireproof character. This, of course, is of direct benefit to such concerns as Mr. Eade's, which are interested in iron, steel and bronze work.

Messrs. Fallon Bros., of Cornwall, Ont., contractors for dredging and other public works, inform us that there will be considerable activity in the Government repairing basin at Cornwall this winter. At the time of writing there were nine dredges, twelve tugs and about thirty other pieces of floating plant, such as flat scows, dump scows and derrick scows, ready to be docked for extensive repairs. Good ship carpenters and caulkers can readily find employment at Cornwall. Messrs. Fallon Bros.' operations for the year represent a value of some $200,000, the work covering dredging, crib building and concrete work, some of which has been described in detail at various times in the Contract Record. Mr. John H. Smythe is superintendent of construction for Messrs. Fallon Bros.

At Peterborough, Ont., during 1911, two and one-quarter miles of pavement were laid. Out of sixty-three and three-tenth miles of public streets, nearly four-fifths are earth roads. Five and one-half miles of sidewalks were laid and nearly a mile of concrete curbs and gutters. Rather more than one-half mile of sewers were laid —by day labor. The City Engineer is Mr. M. Ferguson.

Messrs. James Stewart & Company's Operations

An American engineering and contracting firm, which is meeting with ever-increasing success in the Canadian field, is James Stewart & Company, 1811 Fisher Building, Chicago. The firm is well known in Canada as the Canadian Stewart Company, Limited, with offices in the Eastern Townships Bank Building at Montreal and Fort William, Ont. It will be of interest to give some details of a few of the representative structures erected by this firm during 1911.

In April they broke ground for an addition to the Chicago, Milwaukee & St. Paul Elevator at Kansas City, Mo. This work consisted of fourteen circular reinforced concrete tanks with a capacity of half a million bushels. The tanks were 22 ft. 11 in. in diameter and 85 feet high, supported on a reinforced concrete mattress. Two 36-in. conveyor belts were provided in the basement and in the concrete cupola surmounting the tanks were also two 36-in. belts discharging through self-propelling trippers. Excellent time was made in constructing the tanks as they were ready to receive grain before the end of July.

A structure of a different type is the six-storey cooler building which is being erected at Edmonton, Alta., for the Swift Canadian Company. It is of the now very familiar concrete skeleton and brick curtain wall design. The floors are of reinforced concrete and the cooler rooms are insulated with cork board.

The Ralston Purina Mills Elevator at St. Louis, Mo., is another of the Stewart Company buildings which is nearing completion. This is a concrete elevator of 300,000 bushels capacity and is fireproof throughout. No particular difficulties of an engineering nature were encountered in any of these jobs.

Another of the structures of the past year erected by this firm is the marine receiving tower for the Washburn-Crosby Company at Buffalo, N. Y. While utility must naturally be the prime cnsideration in industrial construction, it is always gratifying to be able to combine with efficiency, pleasing outlines and finish. In this case the contractors have been eminently successful. The tower is circular with a diameter of 32 feet and rises 160 feet above the dock. An interesting feature is the simplicity of the design. A concrete slab resting on piles forms the foundation and from this slab the circular wall rises, a perfect cylinder. A concrete cornice of good lines and a conical concrete roof cap the tower. The interior is entirely constructed of concrete and steel. There are eight floors connected with circular steel stairways. A marine leg having a capacity of 20,000 bushels per hour, electric motors and a 300-bushel hopper scale, are the main items of equipment. A complete system of electric signals and speaking tubes are an efficient aid in operating.

The end of the year will see the completion of one of the company's contracts at Port Arthur. This is a manufacturing plant for the Port Arthur Wagon Company, Limited. The buildings are two storeys in height with brick exterior and fire walls and rest on concrete foundations. The general dimensions of the main building are 75 x 500 feet with a 60 x 105 feet wing. In this building are situated the paint shop, gear storage and erection rooms, the saw room and a fireproof kiln room. Adjacent to the kiln room is a lumber storage building 72 x 179 feet in size. The boiler house is 56 x 75 feet and is entirely fireproof. This work proceeded very smoothly, the most notable feature being that before building operations could commence the entire site had to be drained and stripped of a three-foot layer of muskeg.

Another large industrial plant in course of construction is one at Edgewater, N. J., for the Midland Linseed Company. This is a group of five buildings which will constitute a complete plant for the manufacture of the standard products of the Midland Linseed Products Company. The buildings are concrete throughout. The floors are of the flat slab type and in some of the buildings are designed to take floor loads of 900 pounds. Considerable difficulty was encountered in the foundation work. Over 150 concrete piers were sunk to rock, some of them to a depth of more than twenty feet. Quicksand and a strong flow of water had to be overcome and so a large part of this work had to be done under adverse conditions. A strong battery of pumps, working continuously, was necessary.

The company's prospects for 1912 are very bright at the present time. Preliminary work on a large sea-wall for the C. P. R. on Island No. 1 at Fort William has been done. This is the first unit for the Canadian Pacific coal handling plant. Other work at Fort William and Port Arthur is in prospect.

All the work carried out by Messrs. James Stewart & Company, both as to design and construction, is under the direct supervision of Messrs. W. R. Sinks and R. H. Folwell. who make frequent tours of inspection.

A Successful British Firm

The Cleveland Bridge & Engineering Company, of Darlington, Eng., whose Canadian offices are in the Canadian Express Building, Montreal, have met with encouraging success since opening their Canadian branch a little more than a year ago.

Several important contracts have been carried out during the past year, among which may be mentioned: Queen street viaduct, Toronto, 712 feet long by 55 feet wide, carrying double car tracks and including one river span of 130 feet; Arlington street bridge, Winnipeg, 2,045 feet long, comprised of two approaches of 800 feet, five spans of 81 feet, two spans of 250 feet, one central span of 340 feet, carrying double street car tracks; two double track viaducts for the Transcontinental Railway, Winnipeg, 400 feet long; one swing span crossing the Trent Canal, 200 feet, at Trent River, Ont., and departmental store building, St. Catherine street, Montreal.

The company have in hand the following highway bridges:—At Shawinigan Falls, Que., two spans 250 feet each, one span 128 feet, and one span 203 feet, crossing the St. Maurice River at various points; at Chapeau, Pontiac County, seven spans crossing the Culbute Channel of the Ottawa River; at Heeley Falls, Ont., one swing span crossing the Trent Canal; at Trail, B. C., a four-span bridge.

The designing of all the work is carried out under the supervision of the Canadian manager, Mr. W. Chase Thomson, who is ably seconded by Mr. A. P. S. Glassco, Assistant Engineer. Mr. D. M. Chadwick is Chief Draughtsman and is supported by an efficient staff. Mr. A. Nuttall is Superintendent of Erection.

Municipal Work at St. Thomas

We are indebted to Mr. M. H. Baker, City Engineer of St. Thomas, Ont., for particulars concerning the work of his Department during 1911. The city constructed 4,660 lineal feet of 4-foot cement sidewalk, 650 lineal feet of 3-foot walk, and 1,600 lineal feet of 10-foot walk. The contract price of the walk was 11½ cents per square foot. Nearly six thousand feet of concrete curb were constructed at a contract price of 26 cents per lineal foot. Twelve thousand yards of Westrumite were laid, also 18,000 yards of water-bound macadam. Only a small amount of sewer work was done. 960 feet of 8-in. sewer being the total amount constructed.

Mr. Mason H. Baker, City Engineer of St. Thomas

The oiling of streets was tested on several streets and proved satisfactory. The practice of oiling all macadam and earth streets, instead of water sprinkling will be recommended.

At the waterworks considerable work is being done, this comprising the construction of a coagulating basin. capacity 400,000 gallons; clear water basin, capacity 1,000,000 gallons; and the installation of an electric pump, capacity 3,000,000 gallons in twenty-four hours, and a steam reserve pump, capacity 5,000,000 gallons in twenty-four hours, for the purpose of lifting the water from the reservoir to the coagulating basin. This work will not be completed until spring.

A wooden bridge at Palm street, 330 feet long and 50 feet in height, has been removed and replaced by an 8-foot concrete box culvert 170 feet in length. The ravine at this place has been filled in to the approximate height of the old bridge.

Nineteen hundred and eleven was a busy year with the Lock Joint Pipe Company, 165 Broadway, New York, the estimated total value of whose work was $750,000. This firm is now engaged upon important contracts for Saskatoon, Sask., Toronto, Ont., Wichita, Kan., Havana, Cuba, etc. The superintendent of construction for the company is Mr. John C. Mitchell. The contracts include reinforced concrete pipe for sewers, water works, etc., and reinforced concrete telegraph poles. The Lock Joint people are enthusiastic over the prospects for the coming season ann they are particularly optimistic concerning the Canadian field as they realize that there is a wide scope for their activities in municipal construction here.

In the Queen City, Messrs. Fred. Holmes & Son, Limited, were one of the busiest contracting firms during the past season. The value of their work was something like $300,000. The principal contracts upon which they are now engaged are the library addition to the Parliament Buildings, the extensions to St. Michael's Hospital, and the Quebec Bank, on King street west, Toronto. The construction is in charge of Mr. C. R. Holmes. The season's work for the Holmes' firm has included the laying of about 300,000 common and pressed brick; 50,000 cubic feet of cut stone work; $60,000 worth of terra cotta fireproof floors and partitions and $30,000 worth of work in the subsidiary trades. The equipment used has consisted of steam derricks, barrow hoists and the usual contractors' plant. An active season is anticipated during 1912. As soon as the weather permits the firm will start operations on the brick work and cut stone at the new Government House.

Mr. C. R. Holmes, of the contracting firm of Messrs. Fred. Holmes & Sons, Toronto.

Make a Point

to attend the

Sixth Annual Convention

of the

Canadian National Association of Builders

in Toronto

Remember the Date —— February 20, 1912

Personal News and Notes

Articles of incorporation have been granted to the Western Construction Company, Limited, Regina, capitalized at $250,000.

The New Brunswick Construction Company, Limited, of Welsford, N. B., capitalized at $49,000, have obtained a charter.

The Gilchrist Brick & Development Company, Limited, of Ruskin, B. C., has obtained a charter with a capital of $30,000.

Mr. C. O. Bower, representing Sir William Arrol & Co., England, manufacturers of cranes, is taking a trip through Canada in the interests of his firm.

Nineteen hundred and eleven was a great building year at Hamilton, Ont., where the permits totalled nearly $4,250,000,—an increase of one and one-half millions on the total for 1910.

Messrs. J. P. Hynes, Joseph Oliver and E. R. Rolph have been selected to the conference committee of the Toronto Board of Trade to represent the section of architects, enyineers and contractors.

Mr. W. A. Porter, the retiring manager of the Standard Sanitary Company, Toronto, was recently presented with an illuminated address, etc., by the employees and travelling staff of the firm.

The Wood-Guthrie Company, Limited, of Toronto, have incorporated with a capital of $100,000, as builders and general contractors. The directors include Messrs. L. M. Wood, G. H. Gordon and O. H. Linton.

The Winnipeg Board of Trade has petitioned the government to remove the duty on cement, claiming that the present prices obtaining in the west are inimical to the building interests of that section of the country.

The revised estimate for the proposed enlargement of the Welland Canal, as given out by the Department of Public Works, is from $35,000,000 to $50,000,000. It is expected that a special commission will be appointed shortly.

Dr. J. W. S. McCullough, Provincial Health Officer, left Toronto last week for New York, where he and City Engineer Ker, of Ottawa, will commence a tour of the principal United States cities, inspecting water and sanitary methods.

The Canadian Northern Railway proposes to construct an extension of the Toronto, Niagara & Western, which has been authorized from Toronto to Niagara, while the western region will be tapped with a line from Hamilton to Brantford.

At Victoria, B. C., the lowest tenderer for the Sooke Lake Waterworks was the Westholme Lumber Company at $1,169,720. The company figured on 40-in. reinforced concrete pipe to be made on the ground and laid directly in the excavation trench.

The Canadian Pacific Railway will shortly begin work on its proposed new line from Montreal to Toronto, via the Lake shore route. The route of the new line, which has been under consideration for many years, has been filed with the Railway Commission and it only waits approval for work to be started.

On the recommendation of the Montreal Conduit Commission, Mr. Walter J. Jones has been appointed engineer to superintend the construction of the underground conduits in which all overhead wires are to be placed. The salary is $500 per month. Mr. Jones has recently been superintending the laying of conduits in Reading, Pa.

A party of divisional officers of the Canadian Pacific Railway, with headquarters in Nelson, B. C., inspected the site for the new steel bridge which the C. P. R. will construct across the north fork of Kettle River on what is known as the Granby spur. This structure will be some 350 feet long and will cost in the neighborhood of $100.000.

Mr. D. B. Brown, of Toronto, has been appointed City Engineer of St. Catharines, Ont., at a commencing salary of $1,700.

A bill is before the Alberta Legislature to grant a charter to the Canadian Northern Western Railway, a Mackenzie-Mann project, for the construction of fourteen additional lines to those the company was given authority to construct last session. Eight of these lines are ones the government has indicated it will assist in its railway policy.

The estimated cost of the Second Narrows Bridge, Vancouver, the project of the Burrard Inlet Tunnel & Bridge Company, is now placed at $2,125,000. The first estimate was $1,250,000. The type of the bridge has not yet been chosen, it being the intention of the engineer, Mr. Edward Cruttwell, to confer with his associate, Sir John Wolfe Barry, before any final design is selected.

The revised estimate of the engineers of the Railways and Canal Department in regard to the cost of enlarging the Welland Canal would make it appear that the proposal will involve an expenditure of fully $35,000,000, and possibly of $50,000,000. It is probable that the determination of the policy of the Government both in regard to the new Welland and the Georgian Bay Canals will be left to a commission for investigation.

A sensational announcement comes from Quebec to the effect that the representative of a Scottish firm has been discovered in offering a bribe of $10,000 to the consulting engineer for the waterworks department with a view to obtaining the acceptance of his firm's tender for cast iron pipe. The contract involved is for a water main to cost approximately $300,000. The accusations are emphatically denied. Thorough investigation will be made by the city council.

Word comes from New York that Supreme Court Justice Cohalan has signed an order permitting Mrs. Marion Dell Carrere, widow of John M. Carrere, the architect, to settle for $30,000 her suit against the receivers of the Metropolitan Street Railway Company and the Mason Seaman Transportation Company. On February 20 last a taxi-cab in which Mr. Carrere was riding was struck by a Madison avenue surface car, and he suffered injuries from which he died on March 1.

The directors of the Canadian Pacific Railway have announced the issue of $18,000,000 of new stock. It is understood that Canadian Pacific management is considering the purchase of equipment, improvements to terminals and hotel properties which would cost in the aggregate about $45,000,000. Only a small part of this amount can be charged to the common stock. The balance would undoubtedly be raised through the sale of further preferred debenture stock, which stock is most popular in London.

The Keenan Structural Slate Company, Bangor, Pa., have compiled an excellent catalogue illustrating much that is interesting in the way of sanitary slate fixtures. All the slate furnished by the company is quarried from the famous Bangor vein and is claimed to have no superior for color, strength and durability. The brass work shown in the catalogue is made up in the company's foundry. The entire fixtures are set up in the company's factory, carefully drilled, fitted and adjusted for shipment.

Mr. L. A. Whitsit, one of the resident engineers of the Long Sault Development Company, Massena, N. Y., was in Montreal last week. In the course of an interview Mr. Whitsit stated that efforts would be made to secure international sanction of the project for the damming of the Long Sault Rapids, near Cornwall. The proposed expenditure is about $40,000,000. The company estimate that they can develop anywhere from 500,000 to 700,000 horse power, which can be transmitted all over Eastern Ontario and Western Quebec.

The Montreal City Council has, on the request of the controllers, voted $10,000 for the preparation of the plans for an addition to the city hall. At the same time the council requested the controllers to consider whether it would not be more economical to establish a permanent department of architecture than to appoint architects each time the city has buildings to erect. Messrs. Marchand & Haskell have been chosen by the Board of Control as architects for the improvement. They are now at work on the plans, it being intended to erect a building in harmony with the style of the present city hall.

Among recent western incorporations we note the following: Western Farmers' Lumber Company, Limited, Winnipeg, capital $250,000; McDiarmid & Clark, Limited (lumber), Brandon, capital $150,000; British North American Construction Company, Limited, Vancouver, capital $100,000; Electrical Construction Company, Limited, Vancouver, capital $75,000; South Vancouver Lumber Company. Limited, Vancouver, capital $50,000; Fraser Lake Water & Power Company, Limited, Victoria, capital $25,000; Port Moody Building & Contracting Company, Limited, Port Moody, B. C., capital $10,000; Ashawota Power Company, Limited, Vancouver, capital $10,000.

The Building Department of the Montreal Council has issued a new form on which inspectors of theatres, moving picture and other halls have to make their reports. Particulars under twenty-eight heads have to be supplied, and the information required is of the most comprehensive character; it includes the size and nature of construction of buildings, number of exits and their character, aisles, seats, scenery, dressing rooms, fire escapes, heating system, fire extinguishing appliances, motion picture apparatus, etc. There have been many complaints in Montreal as to the dangerous nature of moving picture and similar halls and also as to the disregard of by-laws affecting exits.

Messrs. John Whitehead & Company, Limited, Albert Works, Preston, England. have compiled in their catalogue No. 127 much information of practical trade interest. The catalogue is descriptive of the company's patent and improved clay-working machinery and appliances for the manufacture of bricks, tiles and pipes, etc. Whitehead machinery has been awarded numerous prizes and medals at various international exhibitions. John Whitehead & Company, Limited, have been manufacturing brick and tile machinery for upwards of seventy-five years. Their machines are especially suitable for export, as a proof of which they are to be found in every quarter of the globe.

Patrick O'Donnell, a contractor, has entered action against the Township of Widdifield and Town of North Bay for $10,000 for alleged breach of contract. Just prior to the annexation of a portion of the township by the town last year the township passed a by-law to provide the section to be annexed with public works to the extent of $33,000, with the evident intention of passing the indebtedness over to the town upon the annexation of the district concerned. O'Donnell was given the contract by the township for sewers and waterworks construction, but litigation prevented the work being carried out, only a small start being made by the contractor, and the by-law was eventually quashed by the courts. The damages asked are for the profits which would have been derived from the contract, and work performed at the contractor's request. A clause was inserted in the contract providing that if suitable financial arrangements were not made the contractor would not be obliged to continue the work. This clause was made a feature of the defence.

A deputation from the Province of Quebec Association of Architects, Montreal, on Wednesday, December 27, visited Quebec and interviewed the Provincial Cabinet on the question of the schedule of fees now charged to clients. At present the legal schedule allows five per cent. on buildings costing up to $50,000; four per cent. between $50.000 and $150,000; and three per cent. on amounts above this. The deputation asked that architects be allowed a flat rate of five per cent. and pointed out that no other association had a sliding scale; five or six per cent. was the more general fee, and the American Institute charged six per cent. The whole question of fees was discussed, and the Premier promised that the Cabinet would consider the subject.

It is stated that the complete scheme of the Canadian Northern Railway in Montreal includes a tunnel under Mount Royal, three miles long, into the heart of the city, a big station at the city end of the tunnel on a site at the corner of St. Monique and Dorchester streets, running down to Lagauchetiere street, and a fine hotel on the site of the present Bath Hotel. The proposed model city near Back River will occupy 4,800 acres, and will be on both sides of the electric line from Back River. An overhead line is to be constructed from the city station to the river front, connecting with the Harbor Commissioners' lines, and a spur line from the present station in Moreau street to the harbor line in the east end of the city is also planned. In addition, freight sheds are to be constructed near the corner of William and Nazareth streets. Pending the completion of the tunnel, the main line, when it reaches the Island of Montreal, will be connected with the Moreau street station. The whole scheme has involved the purchase of a large amount of city property, which has been carried on with great secrecy.

Canadian Patents

The following is a list of recent patents relating to contractors' appliances and the building trades. Furnished by Fetherstonhaugh & Company, 5 Elgin street, Ottawa.

136,227. Chas. Roberts and Jno. Fletcher, Winnipeg, Man.—Roof and wall tiles.

136,241. F. Barber, Toronto, Ont.—Process for producing a powdered or sand-like finish on concrete or other work.

136,293, Jas. Johnson, Holstein, Ont.—Machines for mixing concrete.

136,370, H. Chas. Burchell, Sydney, N. S.—Cements and processes of Manufacturing.

136,469, Jno. Wettlaufer, Toronto, Ont.—Concrete mixing machines.

Montreal Building Code "a Farce"

Those who are in a position to know affirm that the building by laws of Montreal are badly in need of thorough revision, and that the civic building department needs reorganizing and strengthening. Mr. A. Chausse, the inspector, is handicapped in his work by the under-staffing of the department, and he has for a long time been urging the appointment of additional inspectors. It is proposed to add four men to the staff, at a salary of $1,000 each—inadequate enough—but with the ever-increasing extension of the city it is doubtful if this is sufficient to cope efficiently with the work. It is impossible under present conditions for buildings to be properly inspected, and Mr. Geo. Ross, of Ross and MacFarlane, declares the inspection to be a farce. He advocates a corps of experts to carry out the work, and cites Toronto as being far ahead of Montreal in this respect. The present system puts a premium on jerry building, inasmuch as there is no inducement for anyone to put up a modern and fireproof building when another man can run up a fire-trap alongside it and draw the same revenue.

Mr. G. W. Woods, of Hutchinson, Wood & Miller; Mr. A. F. Dunlop; Mr. D. J. Spence, of Finley & Spence; Mr. J. Venne, and other architects, have condemned the lax system—or rather, want of system, of inspecting buildings, and made various suggestions, including the appointment of a building commission, to remedy conditions.

Such strong criticisms will probably strengthen the hands of the committee who are now drawing up a new set of by-laws dealing with buildings and fire protection. The committee appointed by the city which has the matter in hand has consulted various persons and bodies interested, and a very comprehensive by-law, dealing with all phases of the building trade, is promised. It will be a complete new law, and will recommend the strengthening of the building department by the engagement of a staff of experts. The committee is composed of Mr. A. Chausse, Mr. Joseph Venne, architect; Mr. W. J. Francis, civil engineer, and Mr. T. Butler, one of the city attorneys.

To Manufacture Fireproof Trim

An industry of paramount importance to the building trade of Canada is about to be established in Montreal under the name of the Canadian Metal Products Company, Limited. This concern will manufacture fireproof metal window frames, doors, wainscotting, sanitary metal base, door jambs, and interior metal bank fixtures. The capital of the company will be $1,000,000 in common stock and $500,000 in preferred, the greater portion of which will be held by Canadian capitalists. The United States Metal Products Company of College Point, New York, also will be largely interested. The Canadian Company will have the right to use all the patents of the United States Company, which have been developed after the expenditure of three-quarters of a million dollars in experiments during the past quarter of a century. Electric welding is one of the principal features of the process employed, while the perfection attained in rolling and pressing steel and Kalamein and giving these the appearance of natural woods, combined with the qualities of fire-resisting metals, is remarkable. The manufacturers regard this as the final step in the attainment of absolutely fireproof construction for skyscrapers, apartment houses, factories, etc. Wherever adopted it has resulted in the substantial reduction of insurance rates, and other economies. The strength of the new enterprise may be judged from the fact that Mr. N. Curry, president of the Canadian Car & Foundry Company, Limited, is spoken of as the probable president; and he will have associated with him Messrs. J. W. McConnell, W. W. Butler, F. W. Fairman, F. H. Hopkins, W. F. Angus, Lorne C. Webster, A. M. Irvine and Dr. Milton Hersey. Options have been secured on suitable properties, one of which includes factory buildings ready for use. The machinery required would be brought from the United States and will be a duplication of that now employed by the United States Company. This could be installed and ready for operation in ninety days. Already the company has in prospect a quarter of a million dollars' worth of work in this country, included in which are some of the more important contracts now under way or in contemplation for next season in Montreal.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Assiniboia, Man.

Tenders were called until Dec. 29th for 24-ft. pavement N. side of Portage road from w. limits of Winnipeg to lot 20 Parish of St. James; also tenders for reinforced concrete culverts at lots 24-27, St. James on Portage road. Plans, etc., at office of secretary and at Highway Commrs. office, Parliament Bldg., Winnipeg. Secretary-treasurer, Frank Ness, Kirkfield Park, P. O.

Cartierville, Que.

Tenders called for the construction of sewers. Plans with engineer. Received by Mayor and Councillors until 7 p.m., January 2nd. Municipal engineer, F. C. Laberge, 30 St. James street.

Dorval, Que.

The municipality of Dorval will ask Legislature for power to borrow $100,000 for waterworks, sidewalks, electric light, drainage—area involved, about four square miles.

Dunnville, Ont.

Plans are being prepared for waterworks service; pump house to accommodate two turbine pumps, 500 imp. gal. per min. with total head of 230 feet. Two gas engines, belt connected to pumps. One steel elevated water tank, 100,000 imp. gals. capacity, bottom of tank to be 90 feet from ground. 9,640 feet of 4-in. and 6-in. water mains. including 17 valves and 19 hydrants. Plans, etc., to be prepared late in January. Work to be let by contract. Ratepayers have voted $24,000. Engineer, A. M. Jackson.

Hamilton, Ont.

The Board of Works will investigate road materials, endeavoring to secure some new watertight material superior to macadam and not as expensive as asphalt. For this about $100,000 of an appropriation will be made. Another $75,000 will probably be spent under local improvement on new permanent pavements on residential streets.

Quebec, Que.

The following tenders were received: for water supply schemes: M. Connolly, Quebec, $716,499; M. M. O'Brien & Doheney, $743,506; Laurin & Leitch, Montreal, $797,000. For steel pipes and whole contract: M. Connolly, $470,954; Laurin & Leitch, $558,000. Engineers of Department, Messrs. Gallagher, Forrester & Tremblay.

Saskatoon, Sask.

The following by-laws carried by ratepayers: Storm water sewers, $72,000. $85,000 for purchase of new pumping plant for municipal waterworks system. City Engineer, G. T. Clerk.

Strathcona, Alta.

Tenders will be called early in 1912 for new 2,000,000-gal. pump to supplement present pumping capacity. City engineer, A. J. McLean.

Toronto, Ont.

Tenders for sewer on Barton ave., will be received until January 16th, not 26th as stated in our issue of last week.

Tenders will be received until January 16th for the construction of sewers on Hocken ave. and Ellsworth ave., from Vaughan road to Bracondale ave. Address G. R. Geary, Chairman Board of Control.

Notice has been officiall-- given of the proposed extension of Bird avenue from its present westerly terminus westerly to Greenlaw avenue. City clerk, W. A. Littlejohn.

Tenders are called for construction of East Toronto outlet sewer, Sec. No. 3; storm overflow sewer, Barton avenue, Sec. No. 1. Specifications at office of city engineer. Received by chairman until noon January 16th. Chairman Bd. of Control, G. R. Geary.

The city is planning the construction of sewers on Sorauren avenue, $44,077; concrete curbing on Austin Terrace and St. Lawrence streets $902; pavements on Austin Terrace, lane 1st west of River street and St. Lawrence street, $17,828. City clerk, W. A. Littlejohn.

Tenders are called for supply of lead pipe for 1912. Specifications at office of city engineer. Received by chairman until noon January 16th. Chairman Bd. of Control, G. R. Geary.

Winnipeg, Man.

The council has authorized the construction of a 24-ft. macadam pavement on Preston avenue. Full width asphalt No. 2 pavements on Wolseley, $28,270; King street $338; Alexander avenue, $557; sewers—Home street $1,000; Preston avenue, $200; Burrows, $1,800. The following water mains were ordered to be laid, namely, $627; Quelch street, $158; Sargent avenue, $670. Secretary Bd. of Control, M. Peterson.

CONTRACTS AWARDED

Edmonton, Alta.

Pavement for 1912; City Engineer, A. J. Latornell. Successful bidders: Bitulithic & Contracting Limited, secured 75,000 square yards at $2.90; National Paving Co., (sheet asphalt), secured 30,000 square yards at $2.90.

Strathcona, Alta.

Pavements, cost $350,000. City Engineer, A. J. McLean. The Bitulithic & Contracting Co. secured 50,000 square yards paving at $2.85. The National Paving Co., 75,000 square yards, at $2.85.

Moose Jaw, Sask.

Water pipe. City engineer, J. M. Wilson; consulting engineer, W. J. Francis. St. James street, Montreal; contractors, Whitlock & Marlatt. Moose Jaw. Laying of one mile of 20-in. vitrified tile pipe.

Montreal, Que.

Steam pump, cost $22,818. Successful tenderers, Canada Foundry Co., King & Smcoe streets, Toronto, $22,818; 11,000,000 gal. with gate and check valves, independent air pump, etc.

Victoria, B. C.

Water supply, Sooke Lake. Consulting engineer, Wynn Meredith; successful builder, Westholme Lumber Company, $1,169,720. The contract has to be authorized by vote of ratepayers about middle of January.

Winnipeg, Man.

The following are some of the contracts awarded for water pipe, valves, etc., for high pressure system: Canadian Iron Corporation, Montreal, 2,000 tons 10-inch (high pressure) water pipe, 5,000 tons 12-in. (high pressure) water pipe. T. McAvity, St. John, high pressure valves; Florence Iron Works, Philadelphia, 15 8-in. hydrants; A. B. Smith Mfg. Co., East Orange, N. Y., brass goods for service; Crane & Ordway Co., 93 Lombard street, Winnipeg, 60 tons pig lead.

Railways, Bridges and Wharves

Devil's Island, N.S.

Tenders are called until Jan. 11th for construction of extension to breakwater. Plans, etc., at department and at offices of district engineers at Millidge, Antigonish and on application to local postmaster. Dept. of Public Works, Ottawa; secretary, R. C. Desrochers.

Hamilton, Ont.

The Hamilton, Waterloo & Guelph Ry. Co. propose to build an electric railway to Galt. President, Paul J. Myler, general manager Canadian Westinghouse Co., Hamilton; promoter, John Patterson, Terminal Station Bldg. Financiers, International Bond & Share Co., New York. Westinghouse-Church-Co., Hamilton, have prepared plans. Plans to be examined; if satisfactory, McArthur Bros. subsidary to Int. Bond & Share Co., will start construction. To preserve charter, work must be under way by July 1st, 1912. Further details next month.

Surveyors are at work in south east preparatory to making extensive additions to freight sheds and yards for Toronto, Hamilton & Buffalo Ry. General Supt., H. H. Adams; chief engineer, R. L. Latham.

Plans are ready for filing for entry to city of Canadian Northern Railway. Vice-pres., D. B. Hanna in charge of Hamilton work. Plans show railway entering city back of Dundurn Park along s.s. of Barton along diagonally north to site of new station bounded by James, Murray, McNab and Stuart streets, thence diagonally N.E. to site of new freight sheds. Simcoe, Ferrie, Navy and Ferguson. Viaduct ½ mile long brings tracks to station, a big earth fill needed at Coal Oil Inlet, about 400 houses will have to be wrecked.

Lethbridge, Alta.
Traffic bridge north of city has been recommended by Hon. A. J. McLean to legislature now in session. Exact site has not been defined.

Montreal, Que.
Canadian Pacific Railway, Montreal, are having plans prepared for the erection of new train sheds.

New Westminster, B. C.
Another railway bridge for railway traffic across the Fraser here is considered necessary by Provincial Government. Hon. Thos. Taylor, Minister of Public Works.

Penticton, B. C.
Kettle Valley Railway plan a line to be put through between Penticton and Merritt in specified time. Car shops, etc., to be built this year.

Porcupine, Ont.
The Temiskaming & Northern Ontario Railway Company plan a new station and townsite on Porcupine branch to be laid out on the Schumacher property south of Pearl Lake. J. L. Englehart, Chairman of Commission.

Rimouski, Que.
Tenders are called for construction of breakwater. Plans, etc., at offices of district engineers at Quebec, Montreal, and on application to local postmaster. Tenders received by secretary until 4 p.m. January 16th. Department of Public Works, Ottawa; Secretary, R. C. Desrochers.

Toronto, Ont.
A permit has been granted for a loading deck and foot bridge, Keele and St. Clair ave., for Swift Canadian Company, Keele street. Owners are builders.

Vancouver, B. C.
It is stated that possession of the Deadman's Island has been given by a ruling of Privy Council to Theodore Ludgate, thereby rendering nil the plans for armoury by Dominion Government. Plans for wharfage and warehouse, involving a large outlay, will be submitted for approval after which work will start. E. L. Kinman, 318 Hastings street west, Vancouver, is interested.

Walkerton, Ont.
Tenders are called until January 23rd for steel bridge over Saugeen River, 10th concession. County Engineer, Jas. Warren, Walkerton. Two spans, 125-ft. each and one span 90 ft. or two spans of 165 ft.; 16-ft. roadway and concrete floor. Also tenders for two abutments and two piers for same of concrete. Separate tenders required for bridge and abutments. Specifications with engineer.

See advertisement in "Tenders and For Sale Department" of this issue.

CONTRACTS AWARDED

Ottawa, Ont.
Bridge, cost $99,500, for City of Ottawa; city engineer, N. J. Ker. Successful tenderer, Jones & Girourard, $99,500. Others tendered as follows: J. O. Toole, $139,000; Geo. Goodwin, $120,000; Union Construction Co., $124,975; R. Brender, $103,032; Ottawa Construction Co., $105,000; Jones & Girourard, $123,456; T. McLaughlin, $109,434, all of Ottawa.

Hudson Bay Railroad. Department of Railways & Canals, Ottawa. Contractor, J. D. McArthur, 204 McArthur Building, Winnipeg. Contract awarded for first section of 185 miles by late government in August and held up since, has been authorized. Work will proceed at once.

St. John, N. B.
Wharves, cost $800,000, Sand Point, West St. John. Contractors, M. Connolly and E. P. Charleson. Wm. Lewis & Sons, St. John, will supply bolts. Work is to commence as soon as the equipment and materials being brought to the city are on hand. Foundations expected to be put in during winter. Work to start in spring on a large scale. It is estimated it will take a couple of years to finish. Contract calls for 500 tons of material.

Public Buildings, Churches, Schools, etc.

Cowichan, B. C.
The residents of Salt Spring Island are raising funds for establishment of hospital.

Calgary, Alta.
Tenders are called for alterations and addition to Customs Fittings. Plans, etc., on application to J. J. O'Gara, resident architect and at Department of Public Works, Ottawa; secretary, R. C. Desrochers. Received by secretary until 4 p.m., January 10th.

The proposed extension of post office here is not meeting with favor. Estimates for next year will likely include a new building.

Hamilton, Ont.
Hamilton Golf and Country Club are contemplating the erection of a club house, cost $10,000. President, F. R. Martin, 2 Hughson street. No architect chosen yet.

Kingston, Ont.
Tenders will be called shortly for alterations to schools, Rideau, Cataraqui and Louise. New window sashes, hardwood floors, modern plumbing and lavatory equipment, hot water heating, concrete walks. Address Kingston School Board, Bagot street. Architect, Arthur Ellis, 181 University avenue.

Montreal, Que.
Land will be bought and a building erected to be used as a new public market in St. Denis Ward. Plans not decided on.

Tenders of A. Belair, 97 St. Catherine street, Maisonneuve, recommended by Board of Control, $40,500, for fire station, St. Dominique. Two storeys, 40 x 96, brick and stone (fireproof), masonry foundation, hot water heating, electric lighting, Sparham cement roof, interior finish, fireproof, steel frame. Work not started. Owner, City of Montreal. Architect, L. R. Montbriant, 230 St. Andre street.

North Battleford, Sask.
Tenders are called for theatre, cost $20,000, for Thomas Theatre Syndicate, North Battleford. Architects, Stephenson & Evans, N. Battleford. Two stys., 50 x 120, brick, terra cotta trimmings, asbestos roofing, steam heating, electric lighting, fire escapes, special theatre grids for scenery. Basement finished. Received by architect until February 1.

New Westminster, B. C.
The Labor Temple Company are planning alterations to temple on 7th street and Royal avenue. Concrete basement, heating plant, making hall on top floor. At a later date a new building will be erected.

Ottawa, Ont.
Plans are being prepared for club building, cost $60,000, on Elgin and Albert streets, for Laurentian Club, Slater and Elgin streets. Architect, A. L. Weeks, Canada Life Building, Ottawa. Four storeys, 99 x 66. Proposition of Messrs. Gordon Stewart, E. R. McNeil and E. Larmonth to erect club on site bought for proposed office building favorably considered by Club. Plans to be approved by directors.

Quebec, Que.
Tenders are called for erection of a reception building by Department of Public Works, Ottawa; secretary, R. C. Desrochers.

South Vancouver, B. C.
Plans are being prepared for erection of a church, Fraser avenue, for South Hill Baptist Church. Architect, G. A. Horel, 25th and Main streets. 60 x 84, main floor and gallery, solid brick, stone facings; hard wall plaster, fir interior finish, leaded glass, basement will contain Sunday school rooms, kitchen, gas heating and lighting plant.

Strathcona, Alta.
The ratepayers on January 10th will be asked to vote $25,000 towards the public library instead of accepting Mr. Carnegie's offer. Returning Officer, Secretary C. E. K. Cox.

Dormitory for University of Alberta. President, Dr. Tory. Tenders received on general contract; plumbing, roofing, heating and sheet metal work; electric wiring, marble and tile work. Plans, etc., at Parliament Buildings, Edmonton. Branch Public Works Dept., Calgary; Branch Public Works Dept., Lethbridge. Received by Chairman Board of Governors until noon, December 30th.

St. Boniface, Man.
The ratepayers carried the school bylaw for $220,000. The by-law for $25,000 for recreation hall was defeated.

Saskatoon, Sask.
The following by-laws were carried: $300,000 for construction and equipment of municipal hospital; $28,000 for purchase of site for firehall and equipment; $8,000 for erection of Board of Trade Building.

Toronto, Ont.
The Property Committee, Board of Education will report shortly on purchasing a site and erection of new school to replace present Western ave. school.

Chief of Police Grasett has recommended police station at Centre Island and another at Hanlan's Point, the latter to include winter residence for one constable, a lock-up and a public office.

Council appointed Ald. Rowland, Dr. Hastings, M.H.O., and Property Commissioner Harris as a committee to report on erection, etc., of a municipal abattoir.

Contracts will be let shortly for theatorium, cost $7,000, 1173 Roncesvalles avenue, for J. Kyle, 41 Adelaide street west, Toronto. One and one-half sty., brick.

Royal Canadian Yacht Club contemplate extensions to club house, cost $38,000. Secretary, Porter, Molson's Bank, Bay street. New launch; enlargement of dining room and kitchen; reconstruction of verandahs; vault protection and additional lockers.

Victoria, B. C.
New tenders will be called for St. John's Church, Quadra and Mason sts. Architect, R. P. S. Twizzel, 1019 Metropolitan Bldg., Vancouver. Tenders called for 5th December were too high.

Vancouver, B. C.
The Municipal Council of Delta state plans are being prepared for new municipal hall much larger than present one. It will be necessary to purchase a large safe and fittings.

A New York syndicate, represented by L. Richmond, Jr., is reported to have bought a site near Granville and Georgia streets for a theatre to seat 2,500 and to cost $250,000.

Competitive plans will be called for university building at Point Grey. Owner, Provincial Government; Provincial architect, F. M. Rattenbury. Victoria.

The Vancouver Club, 901 Hastings st., have a committee appointed to report on new buildings. It is undecided whether present site will be used.

Yarmouth, N. S.
A residence has been presented to hospital board on the condition that it be used as an hospital for three years. $8,000 is on hand for the new hospital under consideration. Secretary, Miss Clara Caie.

CONTRACTS AWARDED

Montreal, Que.
Police and fire station, St. Hubert st. Architect, Z. Trudel, 238 St. Andre st., Montreal. Tenders of T. Lessard & Son, Ltd., 191 Craig street east, accepted at $72,000, fireproof construction. 2-storeys, 70 x 110, brick with stone trimmings, masonry foundation, hot water heating, electric light.

Ottawa, Ont.
Smallpox hospital, Porter's Island. Architect, F. C. Sullivan, Ottawa; general contractor, Geo. Grain, Clemow ave., Ottawa. Three stys., solid brick, concrete foundation, electric lighting.

Toronto, Ont.
Graphic Arts Building, cost $100,000, Sheppard and Richmond streets, for Toronto Saturday Night Publishing Co., Adelaide street west, Toronto. Architect, F. S. Baker, Traders Bank Bldg., Toronto. Builders, H. M. Dancy, 220 Howland ave., Toronto; steel work, Dominion Building Co., Toronto; carpentry, R. Shervin, 88 Sherbourne street, Toronto; roofing, A. B. Ormsby, Queen st. east, Toronto; plumbing and heating, W. J. MacGuire, Limited, 88 King st. west, Toronto.

Addition to parish house, cost $3,000. Owner, Trinity Church, Trinity Square; architect, Darling & Pearson, 2 Leader Lane, Toronto. Builder, Geo. H. Walters, 184 Ossington ave. Two and one-half storeys, brick.

Winnipeg, Man.
Industrial Bureau Building, Main and Water streets, for the Winnipeg Development & Industrial Bureau; architect, Jno. D. Atchison, Bank of Toronto, Winnipeg; general contractor, Halls & Aldinger Co., 1010 Union Bank, Winnipeg. General contractors supply all material which are to be of local manufacture. DeCrew Co., supply plastic products.

Residences

Calgary, Alta.
Permit has been granted for residence, cost $3,000, Hillcrest street, for S. D. Green, 744 16th street northwest. One and one-half storeys, 24 x 48, frame, concrete foundation. hot air heating, electric lighting, shingle roofing.

Permit has been granted for two residences, cost $5,000, Sunalta street, for J. A. Knoepfli, 1710 10th street west. Two storeys, 19 x 30, frame, concrete foundation, hot air heating, electric lighting, shingle roof.

Permit has been granted to erect a residence, cost $6,000, for A. VonMulleckie. Architects, Burroughs & Richards. Two storeys, 30 x 56, frame, concrete foundation, steam heating, electric light, shingle roof, hardwood interior finish.

Permit has been granted for five residences, cost $10,000, Regal Terrace, for J. W. McDonald, 1019 5th avenue west. Two storeys, 18 x 32, (each) frame, concrete foundation, hot air heating, electric light, shingle roofing.

Rowley & Carver, 610 Grain Exchange, will build a new house in Rosevale. Two storeys, 26 x 38, frame, concrete foundation, hot air heating, electric light, shingle roofing, hardwood interior finish. Cost $4,000.

Montreal, Que.
Excavation is done for two flats, cost $3,700, Melrose avenue, for John Parisien, 300 Wilson avenue. Two storeys, 25 x 62, brick, concrete foundation, steam heating. gas and electric lighting, felt and gravel roofing.

Henry Gaffney, 13 St. John street, is excavating for six residences, cost $18,000, on Oxford avenue. Two storeys, 44 x 36, brick and 3-in. plank, concrete foundation, hot water heating, gas and electric light, tar and gravel roofing.

Ottawa, Ont.
Permit has been granted for residence, cost $5,000, First avenue, for Isaac Cowie, 198 Carling avenue. Two stys., 38 x 34, brick veneer, steam heating, stone foundation, electric light.

Permit has just been granted for residence, cost $3,500, St. Patrick street, for S. Kronick, 203 Rideau street. Two storeys, 32 x 42, stone foundation, brick veneer, steam heating, electric light.

Toronto, Ont.
Tenders will be called shortly for residence, cost $5.500, e.s. Oriole road, for B. Ranscier. Architect, S. B. Coon, 1106 Temple Building. Two and one-half storeys, brick, stone foundation, structural steel, cut stone (sills brown) hot water heating, 610 feet radiation, weeping tiles, plate and art glass, ornamental iron, galvanized iron cornice, shingle roofing, tiled baths, speaking tubes. hardwood flooring.

Permit has been granted to erect a detached dwelling, cost $3,000, east side Woodville avenue, for J. Thompson, 552 Perth avenue. Two and one-half storeys, brick and stone, tar and gravel roofing.

Excavation is completed for a residence, cost $3.000, 1-3 Wyndham street near Brock avenue, for R. W. Harrison, 40 Beatty avenue. Two storeys, semi-detached, brick.

Excavation is done for residence, cost $3,500, 304 Wright avenue, for John Joss, 302 Wright avenue, Toronto. Two and one-half storeys, brick.

Tenders will be called for apartments, cost $20,000, for Mr. F. B. Pearson. Architect, J. M. Harvey, Manning Chambers. Three storeys, cut stone, galvanized cornice, felt and gravel roofing, telephone system, mantles. plate glass. Received about January 15th. Location withheld.

Tenders are open for erection of apartment house, cost $25,000, s.e. Rosedale and Crescent road, for Dr. S. S. Floyd, 461 Avenue road. Architect, Hy. Simpson, 82 King street east. Three storeys, brick, structural steel, cut stone, shingle roofing, hot water heating, electric lighting, mantles.

A permit has been issued for one detached residence. cost $2,500, e.s. Medland street, for Mrs. E. Thompson, 26 Foxley street. Two and one-half stys., brick, shingle roofing, hot water heating.

Plans are drawn for pair residences, cost $7,200, 66-8 Willow avenue, for W. J. Hewitt, 14 Cedar avenue. Two stys., semi-detached, brick, tar and gravel roofing, hot air heating, electric lighting.

Excavation is done for pair residences, cost $4,000, Davenport road and Albany ave., for Tucker Bros., 335 Howland ave., Toronto. Two storeys, brick, semi-det.

Plans are prepared for apartments, cost $30,000, e.s. Glen road, Rosedale, for Calvin W. Defoe, 47 Simcoe street. Architect, S. B. Coon, Temple Bldg.; three storeys, brick, concrete foundation, cut stone, tile, felt and gravel roofing, steam heating, gas and electric lighting, hardwood interior finish and floors, speaking tubes, electric bells, mantles. Tenders received in one month.

A permit is issued for pair resdences, cost $4,500, 94-6 Fern avenue, for Abram Mundy, 745 Euclid avenue, Toronto. 2-storeys, semi-detached, brick.

A permit has been issued for residence, cost $5,000, 126 Glen road, for Francis R. Perkins, 576 Palmerston ave. Brick, two storeys and attic.

H. J. Lee, 739 Dufferin street, will build a residence, cost $2,800, 260 Concord ave. Architect, A. Lee, 739 Dufferin street. Two storeys, brick.

Tenders will be called shortly for pr. residences, cost $7,000, 18-20 Chicora ave., for Wilkns & Co., 175 Walmer road. Architect, P. H. Finney, 43 Victoria st. Two and one-half storeys, semi-detached, brick.

A Permit has been issued for pair residences, cost $3,000, 41-43 Condor ave., for Lankin Bros., 124 Hampton ave. Two storeys, semi-det., brick.

Vancouver. B. C.
Excavation tenders are called for residence, cost $25,000, Granville and Matthew, Shaughnessey Heights, for Mrs. (Dr.) W. F. Mackay. Architect, W. A. Doctor, 922 Metropolitan Building. 20 rooms, adobe construction, fireplaces, hot water heating, art glass, all modern

devices. Architect not ready for general contract until after the new year.

Plans will be prepared for residence, cost $8,000, Shaughnessy Heights, for Keast & Allen (Jonathan Keast). Architect, J. H. Bowman, Crown Building, Vancouver. Two storeys and basement, stone for first floor, rough cast plaster for upper shingle roor, combination hot water and hot air heating. Indirect lighting system.

CONTRACTS AWARDED

Calgary, Alta.

A permit has been granted for residence, cost $3,500, Mount Royal street, for J. G. Porteous, 310 25th avenue w., Calgary. Two storeys, 24 x 33, frame, concrete foundation, hot air heating, electric lighting, shingle roofing, hardwood interior finish. Owner is builder.

Montreal, Que.

Plans are prepared for three flats, cost $4,500, 140 St. Joseph Boulevard, for Henri Blais, 91 Laurier avenue east, Montreal; general contractor, J. H. Blais, 91 Laurier avenue. Three storeys, 25 x 80, stone foundation, hot water heating, gas and electric lighting, gravel roofing. Work not started.

Toronto, Ont.

Excavation is done for residence, cost $2,500, Medland Cres., near Humberside for Jas. Fuller, 10 Robert ave. Two storeys, brick. Owner is builder.

Work is in progress for pair semi-detached residences, cost $3,600, for W. J. Hewitt, 14 Cedar avenue. Two sty., brick and frame. Owner is builder.

Excavation is done for pair dwellings, cost $5,500, Lansdowne ave., for J. H. Mills, owner and builder, 38 Lansdowne ave. Two storeys, semi-det., brick.

Westmount, Que.

Residence, cost $17,000, West Boulevard, for Robertson MacAulay, care Sun Life Assurance Co., 124 Notre Dame street, Montreal. Architect, R. Findlay, 10 Phillips Place, Montreal; brick and masonry, Robertson Bros., Chestnut ave., Montreal; carpentry, Simpson & Peel, 10 Benoit street; iron work, Dominion Bridge Co., Ltd., Lachine. 3-storeys, 37 x 73, brick and stone, electric and gas lighting, slate roof, hardwood interior finish, furnace heating.

Residence, cost $14,000, Belmont ave., for H. Judah, 952 Dorchester street w., Montreal. Architect, H. A. Adams, 9 Oxenden ave., Montreal; masonry, Hand & Pick, 609 Belmont ave., Montreal; plumbing and heating, W. B. Gilmour, 866 St. Catherine street west, Montreal; electric wiring, Canada Ford Co., Ltd., 485 St. James street. Two storeys and basement. 25 x 40, hot water heating; painting and glazing not yet awarded. Brick stable being built by same contractors.

Business Buildings and Industrial Plants

Amherstburg, Ont.

H. Fox has taken over the Lakeview Hotel and extensive improvements will be made.

Ainsworth, B. C.

Silver Hoard Mine, part owner, Wm. S. Hawley, Spokane, Wash., are contemplating the installation of 3-drill compressors and a sawmill. Three tunnels have already been driven in to a distance of 300 feet. Mr. Hawley is expected back at mine on January 15th, 1912. Work will start in the spring.

Banff, Alta.

The proprietors of King Edward Hotel are planning a new wing, three stys., 50 x 100. Cost $30,000.

Bassano, Alta.

Negotiations are opened for location of flour mill and brick plant for C. J. Danilz, Redcliffe. A branch flour mill and possibly a brick works under construction. Special committee of Board of Trade in charge. Publicity Commissioner Rothwell, W. A. W. Haines, and G. M. Pierce.

The Alberta Pyrofugont Flooring Co. propose to erect a planing mill. Those interested are H. C. Strange, Bank of Commerce, Bassano, and Dr. J. J. Walters, president Canadian Pyrofugont Co., Berlin, Ont. Site has been applied for on the understanding that company would be in operation in about six weeks.

Special civic privileges have been offered to the International Supply Company by the Board of Trade as an inducement to locate here provided that a factory to cost $25,000 be erected. Secretary Board of Trade, W. A. Rothwell, Bassano.

Bloomfield, Ont.

J. H. Baxter's farm of 100 acres, near Picton, Ont., has been purchased as a site for proposed canning factory. Gentlemen interested, H. W. Bedell. B. Y. Cooper and others. Capital $50,000.

Calgary, Alta.

Permit has been granted for an addition to bakery, cost $3,000, Westmont, for Whetlock Bakery. Designer, F. W. Faux Co., 23 Marlborough Block. Two storeys, 50 x 42, frame, concrete foundation, electric lighting, ruberoid roofing.

McLeod Bros., First st. E., have purchased 50 feet on First street west on which they intend erecting stores and offices.

Fort George, B. C.

Chas. Peters and T. E. Stretch are excavating for store, cost $10,000, Central avenue. Two storeys, 20 x 40. Building to be ready by spring.

Hamilton, Ont.

The 3-storey building, Main and Hughson streets, has been purchased by Lawrence Munro, architect, Main and Hughson streets. Building will probably be torn down and new hotel erected.

Machinery is required for machine tool factory, Earl and Princess street, for Ford-Smith Machine Co., 46 Merrick street. President, Percy Ford-Smith. Removal to larger quarters at Earl and Princess streets will necessitate purchase of new machinery and office fittings.

London, Ont.

Merchants Bank of Canada are considering a location down town. Sir Geo. Gibbons has purchased two lots on which he intends to build, the bank purchasing an additional lot adjoining should location be changed.

Temporary quarters have been secured for biscuit factory for D. P. Perrin Biscuit Company in old George White factory on King street. Machinery being installed, new bake ovens, mixing machinery and box making apparatus. The erection of a $300,000 plant in East London is under consideration.

The Battle Creek Toasted Corn Flake Co., Ltd., 584 Grey street, are reported to have secured a site on the Grand Trunk east of Rectory street, for erection of a new factory.

Montreal, Que.

Alex. Nelson & Co., 380 St. Catherine street west, plan to erect a four-storey store at 192 Peel street to be reay by May 1st. Property formerly owned by Dr. Ridley Mackenzie.

The Canadian Metal Products Company, Limited, are contemplating a new industry (metal porducts). Gentlemen interested, N. Curry, president Car & Foundry Co., Ltd., Amherst, N. S.; Lorne Webster, Quebec; Milton Hersey, Montreal. Plant to be established here probably near Lachine. Company will manufacture metal window frames, doors etc.

Wm. Rutherford & Sons, 425 Atwater avenue, will build an extension to box factory, cost $4,000, Levis and Duvernay. Three storeys, 40 x 80, wood covered with iron, cement pier foundation, gravel roofing.

Goodwin's Limited, St. Catherine st., are planning to build an addition of six or seven storeys to departmental store. Building to be extended back to Burnside street.

W. J. Inglis, 238 St. James street, is planning alterations to store and office, 612 St. Catherine street west. Architect, MacVicar & Heriot, 104 Union avenue. Plastering, carpentry and some masonry to be done.

Moose Jaw, Sask.

The Robin Hood Flour Mills Company are looking for site to re-build. J. A. McBeard is favorably impressed with Calgary.

North Battleford, Sask.

Sketches are being prepared for garage, cost $10,000, for Ralph Brigham. Architects, Stephenson & Evans, North Battleford. Reinforced concrete construction, concrete foundation, steam heating, electric lighting, asbestos roofing.

Sketches are being prepared for stores to cost $5,000, for George Graves, North Battleford. Architects, Stephenson & Evans, North Battleford. Two storeys, 50 x 60, concrete foundation, brick front, metallic inside and out, electric lighting, furnace heating.

Hotel, cost $50,000, King and First ave., for Coad & Graves. Architects, Stephenson & Evans, North Battleford. Three storeys, brick, stone trimmings, steel girders, steam heating, asbestos roofing, tile and hardwood interior finish, fire escapes and refrigerators. Contract for foundation let. Tenders reseived for superstructure by architects after January 1st until February 1st.

Sketches are being prepared for furniture store, cost $20,000, King and Firs avenue, for Convey & Fallows. Architects, Stephenson & Evans, North Battleford. Three storeys, 36 x 120, with mezzinine floor, fire escapes, brick with terra cotta trimmings, concrete foundation, steam heating, asbestos roofing, hardwood interior finish, freight lift.

St. John, N. B.

Plans are being discussed for paper mill, Union Point, for Partington Pulp

& Paper Company, Union Point. Secretary-treasurer H. W. Schofield has returned from England where he states plans were discussed. Nothing further can be learned at present.

W. Lewis & Sons, manufacturers of wrought iron work, contemplate enlargement to bolt factory, Britain street. Capacity of plant to be doubled, two new storeys to be added. Firm will supply bolts for wharves at Sand Point.

Work will commence at once on a chemical plant, Greenhead, near St. John. Demand for cement has increased by the construction of wharves at West St. John and the Valley Railway. R. Max. McCarthy, broker, St. John, has been acting for purchasers.

Negotiations are opened for paper bottle factory for the Purity Paper Bottle Corporation, Washington, D. C., and inquiries being made as to establishment of plant here, certain civic privileges required. (Bottles made of stiff waterproof paper resembling cardboard will be manufactured).

Toronto, Ont.

Tenders will be called shortly for stores and residence, cost $6,000, Queen street east, for Jas. Devonshire, 183 Silver Birch avenue. Architect, Jas. Nicol, 10 Windsor ave., Balmy Beach. Two storeys, pair semi-detached, brick piers, metal lath and stucco, concrete foundation, structural steel, cut stone, metallic lath, tar and gravel roofing, fireplaces, hot water heating, electric lighting, store fronts, shelving, counters, plate glass, skylights.

Baillie-Wood & Croft, 95 Bay street, are contemplating the erection of business building, cost $40,000, 218-24 Bay street. Four storeys, 50 x 180.

Excavation is done for store and residence, cost $6,000, for Jas. Devonshire, 183 Silver Birch ave.; architect, Jas. Nicoll, 10 Windsor ave. Two storeys, brick, structural steel, cut stone, stucco, plate glass, freight elevator, skylights, fireplaces, mantles, hot air heating (Pease furnace), store fittings.

Tenders will be let shortly for stores and dwellings, cost $40,000, Gladstone and Dundas, for J. Baker. Architect, T. S. Yolles, 244 Simcoe street. Three storeys, brick, cut stone, galvanized cornice, cut stone, stucco, ornamental iron, hot air heating, electric and gas light, tar and gravel roofing.

Vancouver, B. C.

Plans are prepared for business building at 324 Powell street. Architect, N. E. Symonds, 604 Holden Building, Vancouver. Tenders taken last week on some minor contracts.

Plans are being prepared for erection of a business block for N. E. Symonds, 604 Holden Building, Vancouver. Eight storeys. Plans to be ready for figuring on about January 15th, when tenders will be called.

Plans are prepared for stores and apartments, cost $10,000, 917 Broadway east, for F. J. Inglehart, 1372 8th ave. west, Vancouver. Three storeys, 25 x 1000, frame.

Plans will be prepared for hotel, cost $75,000, 223 Hastings street east, for L. L. Mills, 215 Hastings street east. F. M. Bender, 215 Hastings street east, will prepare plans for an 8-storey building of Kahn reinforced concrete, 25 x 120. Stores on ground floor. Plans ready for figuring on after bad weather is over, when architect will take tenders.

Plans will be prepared for stores and apartments, $20,000, Powell street and Victoria Drive, for W. A. Ingram, Woods Hotel. Architect, J. H. Bowman, Crown Building. Four storeys, 30 x 50, brick, mill construction, billiard room in basement, two stores with mezzanine floor, hot and cold water in 33 rooms.

Victoria, B. C.

Tenders are called for business building, cost $125,000, Johnson street, for Chas. Hayward and F. S. Barnard. Architects, Breseman & Durfee, 516 Sayward Building, Victoria. Six storeys, reinforced concrete, pressed brick. Tenders received by architects until January 15th. Building to be used for hotel, offices and stores.

Yarmouth, N. S.

Bay View Park and Lodge has been purchased by Mr. F. D. Drew, formerly of Arizona, Ill. 40 rooms are being added; roof garden enclosed with glass, concrete bathing pool; "chute the chutes." A gasoline or steam launch will be needed. Modern hotel appointments. Cost $12,000.

CONTRACTS AWARDED

Calgary, Alta.

Bakery, Hillhurst, for Marsh & Sons, 1114 Boulevard, n.w. Two storeys, 30 x 76, frame metal clad, concrete foundation, electric light, felt roofing.

Hamilton, Ont.

Extension to steel plant, $2,000,000, Sherman avenue, for Steel Company of Canada, Limited. General manager, Robert Hobson, Hamilton; engineers, Morgan & Co., Worcester, Mass., U.S.A. Steel contractor, Hamilton Bridge Co. Chief engineer, R. K. Palmer. Roofing, galvanized iron work, Thos. Irwin & Son, 21 McNab street; rod mill and blooming mill (32 feet high), billett mill, two 50-ton open hearth furnaces. Contract to be completed by April 1st, 1912. Company's engineers laying out grounds for several large buildings.

Montreal, Que.

Stores and offices, cost $80,000, Union ave., for W. St. Pierre, 41 Union ave. Architect, Finley & Spence, 46 Beaver Hall Hill. General contractor, Heffermann & Beck, 745 St. Catherine street west; electric work, M. P. Rubenstein, 342 St. James street; plumbing and heating, O'Connell, 183 Ottawa street; kalamein and roofing, Douglas Bros., 19 St. Maurice street; plaster paris modelling, H. B. Tomkins, 265 St. Antoine street; terra cotta, North West Terra Cotta Co., 128 Coristine Bldg. Elevator, A. Hughes-Charles, Montreal; marble and tile work not started yet.

New factory, wood-turning, cost $8,000, Sherbrooke avenue, for Joseph Charette, St. Jerome, Que. General contractor, L. H. Vezina, 1875A Boyer street, Montreal. 21 x 35, brick and wood, stone foundation, wooden roofing.

Re-building cigar factory, cost $15,000, Youville Square. Occupants, Sisters of the Congregation of Notre Dame, 40 St. Jean Baptiste street, Montreal. General contractor, F. A. Grothe, 6 Cuthbert street, Montreal. Stone foundation.

Chemical plant, cost $18,000, for Standard Chemical, Iron & Lumber Co., 524 Ambroise street. Brick and masonry, Bonnell Bros., 341 Guy street Montreal; iron work, Phoenix Bridge & Iron Works, Limited, 83 Colborne street, Montreal. Owner is supervising other work. Work started December 23rd, to repair damage done by explosion on the 19th inst. Two storeys, 30 x 30, brick.

Prince Rupert, B. C.

Stores and apartment building, cost $14,000, for Allan Campbell. Architects, Munro & Bailey. Two storeys, 50 x 100, brick, concrete, basement, steam heating.

Stores and apartments, cost $45,000, for J. E. Merryfield. Builder, J. H. Hilditch. Two storeys, brick.

Toronto, Ont.

Warehouse, cost $40,000, 291 Yonge st. for Sellers-Gough Fur Co., 244 Yonge street. Architect, H. Simpson, 82 King street east; brick work, Holtby Bros., 21 Robert street; carpentry, Jas. McKenzie, 477 Gladstone ave.; roofing, G. P. Breckon, 210 Victoria street; plumbing and glazing, Jas. Casey, 223 Spadina ave.; plumbing and heating, Purdy Mansell, 63 Albert street; elevators, Otis Fensom Ltd.; Bedells Furnishing Co., Ltd., lessees.

Excavation is done for factory, cost $5,000, 25 Brant street, for T. Gingras, 459 Adelaide street west. Two storeys, brick, tar and gravel roofing. Owner is builder.

Warehouse and office, cost $10,000, for E. Leadley & Co., 87 Front street east, Toronto (leather merchant); builder, Wm. Williamson, 137 Woodbine ave. Three storeys and basement, brick, galv. cornice, elevators, tar and gravel roof.

Power Plants, Electricity and Telephones

St. John, N. B.

There is a hitch in the ratification by the city of the New Brunswick Hydro-Electric Company's application for charter, over the interpretation of the clause regarding the taking over of the plant by the city. It is not anticipated that the misunderstanding will occasion any serious delay. Company is going ahead with work of development preparatory to a financial organization.

Windsor, Ont.

The Sandwich, Windsor & Amherstburg Power Company are contemplating making alterations to electric power plant.

Winnipeg, Man.

Tenders are called until January 22nd for supply of one 250 kw. exciter motor generator set with accessories complete; also additional parts to be erected on foundations supplied by corporation in power house at Point du Bois. Specifications at office of Power Engineers, Carnegie Library. Secretary Board of Control, M. Peterson.

Brockville ,Ont.

Mowat and Jackson's tailor shop burned on Dec. 27th, damaged to extent of $10,000.

Strathcona Hotel, five storeys, brick building destroyed by fire on the 27th inst. Estimated loss,. $80,000. Owned by Brockville Loan & Savings Co.

(Continued on page 70)

Tenders and For Sale Department

To Engineers

Every man who puts in a tender on your jobs has got to see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

More contractors and manufacturers read the "Contract Record" than any other Canadian publication. It is the logical place to look for tenders called, and where all important works are advertised.

Send along your plans for your next job and put a line in your ad. to that effect.

Contract Record

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—441 Seymour Street.

To Contractors

Sealed bids will be received for all trades required in the erection of a residence at the northeast corner of Heath street and Forest Hill Road, Toronto, up to noon of **Monday, January 15th, 1912.**

The lowest or any tender not necessarily accepted.

F. S. BAKER, Architect,
Traders Bank Bldg., Toronto.
1-1

Tenders Wanted

For the several trades required in the erection and completion of a proposed Church of England Building at Sudbury, Ont., will be received up to noon, **Thursday, February 1, 1912.**

Plans and specifications may be seen at Secretary's office, Bank of Montreal, Sudbury, Ont.

The lowest or any tender not necessarily accepted.

All tenders to be on forms provided, to be sealed, marked "Tender" and addressed to

W. J. MONTGOMERY,
Sec. Building Committee,
Church of Epiphany,
Sudbury, Ont.
Sudbury, Dec. 12, 1911. 51-1

Tenders for Steel Bridge

Sealed tenders will be received till 4 p.m., **Wednesday, January 23rd, 1912**, for the erection of a steel bridge over the Saugeen River, 10th Concession, Township of Brant. Bridge to consist of two spans of 125 feet each and one span of 90 feet, or two spans of 165 feet, 16-ft. roadway and with concrete floor.

Also tenders for two abutments and two piers for same to be built of concrete. A separate tender is required for bridge and abutments, and enclosing a marked cheque payable to the Treasurer of the County of Bruce for $200 for each tender.

The lowest or any tender not necessarily accepted.

Specifications may be seen with the undersigned.

JAMES WARREN,
Engineer in Charge.
Walkerton, Dec. 26th, 1911. 52-1

Debentures For Sale

The Corporation of the Town of Steelton will receive tenders up to 8 o'clock p.m., January **16th, 1912**, for the purchase of: $82,000 Sewer Debentures, running 30 years, and $32,000 Cement Walk Debentures, running 20 years.

Full particulars on application to

52-2 J. ROBINSON, Clerk.

Sewer Excavator

For sale for immediate use, a Vulcan "Little Giant" Steam Shovel with extra long dipper handle for excavating to 16 feet below surface, mounted on traction wheels, dipper 1¼ yd. capacity. Machine just overhauled; new chain, and extra large new boiler; weighs 32 tons; low price. Address

WILLIS SHAW MACHINERY Co.,
39 South LaSalle Street,
Chicago, Ill.
42-t.f.

For Sale
Concrete Reinforcing

We have on hand 200 1-inch round Bars Mild Steel, free from rust etc, 20 and 24-foot lengths.

Twelve Steel Body C. P. R. Standard Concrete Barrows (Mussens).

100 Insley Form Clamps. 22-inch Lumber, Tools, etc.

Will accept any reasonable offer on equipment. Steel at base price, less 20 per cent. F.O.B. Don Esplanade. Standard Silver Company, Limited, Toronto. 1-1

Notice to Contractors

Main Drainage Works

Sealed tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon of **Tuesday, January 16th, 1912**, for the supplying and driving of Timber Sheet Piling at the Sewage Disposal Works site.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Tenderers shall submit with their tender the names of two personal sureties, approved by the City Treasurer, or in lieu of said personal sureties the bond of a Guarantee Company, approved as aforesaid.

Plans and specifications may be seen and forms of tender obtained from the Main Drainage Department, at the office of the City Engineer, Toronto.

The usual conditions relating to tendering as prescribed by City By-law must be strictly complied with, or the tender will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman, Board of Control.
City Hall, Toronto,
December 30th, 1911. 1-2

Contract to Let

Parties having about 60 or 70 miles of heavy ballasting and trainfilling to do, are willing to sub-let the work to substantial people provided same will rent rolling stock, Lidgerwood and cars now on hand. Apply Box 402, Contract Record, Toronto, Ont. 1-4

Miscellaneous

Advertisements under this heading two cents a word per insertion. Minimum charge 50 cents

Sales Agents Wanted

Large British firm with plants in England, Bohemia and France, manufacturing Carborundum and Electrite goods and high class grinding machinery wants to secure either first class salesmen or firms with established trade connections to represent them in Canada. Apply Box 393, Contract Record, Toronto, Ont. 52-1

Large United States firm manufacturing transits, levels, and complete line of engineering and architectural instruments, wants Canadian representatives. Apply Box 398, Contract Record, Toronto, Ont. 52-2

Business Notes

Clinton, Ont.
Fire damaged the grocery store of A. D. Beaton, clothing store of Moorish & Co., and saddlery of W. Johnson.

Frankford, Ont. Near Trenton.
On December 27th fire destroyed the Streetman Hotel block, the Breman Hotel, Telephone office and harness store and six or seven residences. Loss about $25,000.

Halifax, N. S.
King Edward Hotel burned; Wm. Wilson, owner. The building occupied by St. Croix Paper Company was also destroyed and stock badly damaged.

Huntsville, Ont.
On the 29th the store belonging to M. Wardell & Sons was destroyed by fire. The Kent House was badly damaged also.

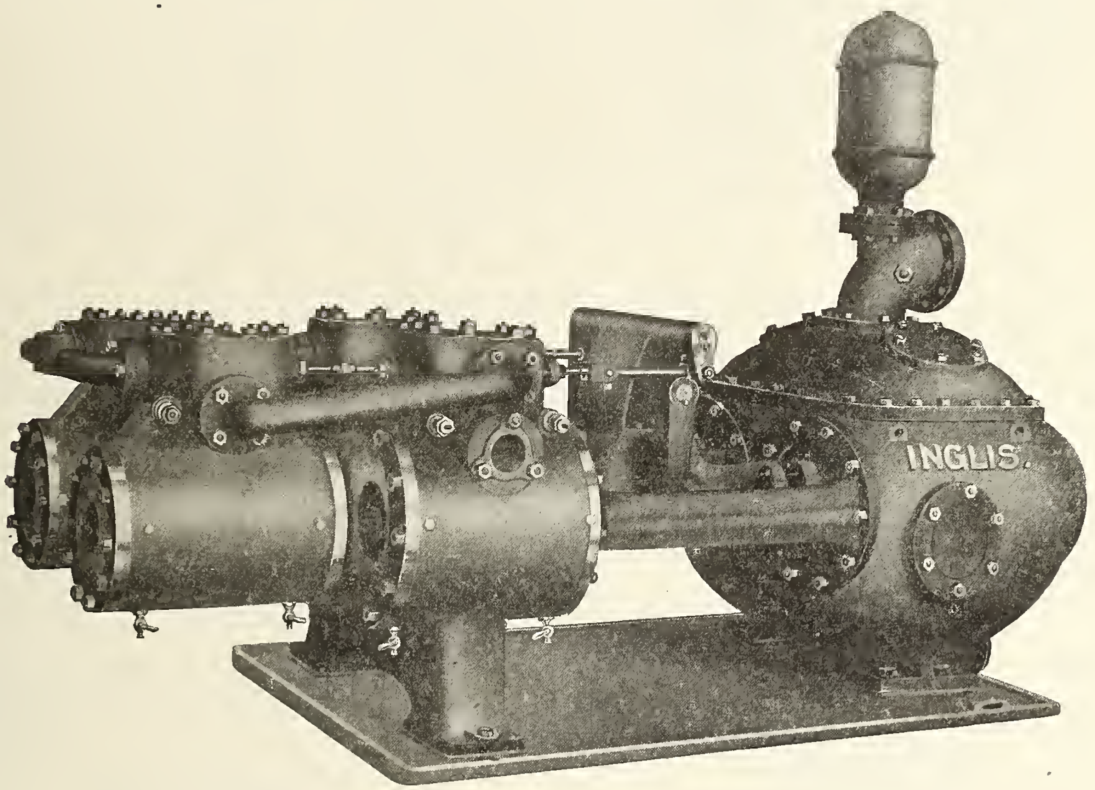
Porcupine, Ont.
Fire destroyed the following buildings: Ewans furnishing store, Strathcona Laundry, Imperial Bakery, King George Restaurant, Carter & Wright's drug store, Lyric Theatre. Loss estimated at $40,000.

St. Mary's, Ont.
Planing mill on Water street north, belonging to George Brown & Co., with machinery and contents destroyed on Dec. 27th. Loss estimated at $10,000.

Vancouver, B. C.
The Terminal Construction & Manufacturing Co., Ltd., Yew and Eleventh streets, Kitsilano, gutted by fire, morning of December 29th. Forty machines ruined; loss $25,000, fully insured. Lumber sheds and office saved. Prepared stock to value of $8.000 destroyed.

Water-Works Plants

for Towns and Cities



"Inglis" 1,000,000 gall. Pumping Engine.

Our long and successful experience in the building and installation of Pumping Engines and Water Works Machinery should be a strong argument in favour of "Inglis" products. During the fifty-two years (52) our plant has been in operation, we have built many Pumping Engines, all of which have given entire satisfaction.

Capacities from one to thirty million gallons per 24 hours.

Send us your inquiries.

The John Inglis Company Limited

Engineers and Boilermakers

14 Strachan Ave., TORONTO, Canada

Miscellaneous

(Continued from page 67)

Brantford, Ont.

The by-law to raise $85,000 for enlargement of hospital was carried by large majority.

Edmonton, Alta.

Gorman, Clancy & Grindley, Limited, were awarded contract for supplying 60 lb. steel rails for street car department at 51.45 per gross ton.

A. J. Latornell, City Engineer, advises us of the following paving awards: Bitulithic Paving & Contracting Company, Limited, of Winnipeg and Edmonton, 75,000 yards of bitulithic paving; National Paving & Contracting Co., Ltd., of Winnipeg, 25,000 yards of sheet asphalt pavement.

Montreal, Que.

Gallery will be built to picture theatre, St. Lawrence Boulevard, for Jos. Ettenberg, 220 Papineau avenue, Montreal; general contractor, Beaubien Construction Co., 653 Mentana street.

Shoe factory on Demontigny street, of Tetrault Shoe Manufacturing Company, 331 Demontigny east (N. Tetrault), damaged by fire on December 30th. Estimated loss, $100,000.

North Battleford, Sask.

A site has been purchased for warehouse for A. McDonald (wholesale grocers), 116 Market E., Winnipeg. Company's contractors, Saul & Irish, 201 Kennedy Building, Winnipeg. Brick and concrete, concrete foundation, steam heating, hardwood floors. Construction will start early in spring.

Ottawa, Ont.

Tenders are called for supply of iron posts for use on survey of Dominion Lands, delivered as follows: At Winnipeg, 5,000 small and 150 large posts; at Edmonton, 150 large posts. Information may be obtained from the Surveyor-General of Dominion Lands, Ottawa. Received till January 15th. Department of the Interior; secretary, P. G. Keyes.

Renfrew, Ont.

The by-law carried for extension to power plant, cost $60,000. Mayor, Dr. McCormick. Consulting engineer, J. B. McRae, Citizen Bldg., Ottawa. Power house, dam, generators, turbines, etc.

St. John, N. B.

Messrs. Ganong Bros., St. Stephen, N. B., who have been operating White Candy Co., Ltd., since spring, also plan to take possession of T. S. Simms & Company's old brush factory, Union st., in January 1st, 1913, as additional candy works.

Plans have been submitted for erection of the Keith theatre, King's Square, for St. John Amusement Company, **Chatham, N. B**; manager, W. H. Golding. Brick with stone trimmings, 158 x 75 or more, seating capacity ground floor, 850 chairs; 750 in first balcony. Clearing of site was commenced on or about Nov. 17th. Plans prepared by Albert E. Westover, Philadelphia.

It is understood that the old post office when replaced by new building, will be remodelled into offices for the use of the government officials in the city. The Provincial Government will co-operate with Dominion Government in maintenance and occupation.

Work will be commenced as soon as weather permits on a broom and brush factory for T. S. Simms & Co., Union street, St. John. President, L. W. Simms. Building to be ready for occupation by December 31st, 1912.

Toronto, Ont.

A permit has been issued for residence, cost $5,500, e.s. Oriole road, for R. Ronseret, Oriole road near Heath st. Two and one-half storeys, brick.

The by-law to construct Danforth avenue Civic car line was carried by a majority of 5,203.

The by-law for Hydro-electric extension carried by 14,466 majority. City Engineer, C. H. Rust; Mayor, G. R. Geary.

For sale, reinforced steel, 200 1-inch round bars, mild steel, 20 and 24 foot lengths; 12 steel body C. P. R. Standard Concrete Barrows (Mussens-; 100 Insley Form Clamps, 22-inch; lumber, tools, etc., steel at base price, less 20 per cent. F.O.B. Don. Esplanade. Standard Silver Co., Ltd., Toronto. See advertisemnt in "Tenders and For Sale" department of this issue.

Winnipeg, Man.

Tenders are called for supply of 5,000 feet of 2½-in. cotton rubber lined fire hose. Specifications at office of Chief Fire Department. Received by Chairman, Board of Control, until 11 a.m., January 8th.

W. H. Stone, 648 Main street, grocer, has purchased property on Main street and Atlantic avenue. It is stated a block will be erected with 33 ft. frontage on Main street.

New Companies

Western Farmers Lumber Company, Limited, Winnipeg, Man., incorporated with a capital of $250,000, to carry on business as manufacturers of pulp, paper, wood products and carry on a general lumber business in all its branches. Incorporators, David K. Mills, John Spencer and Robert A. Bonnar, all of Winnipeg.

Lloyd's Investment Company, Limited, Winnipeg, Man., incorporated with a capital of $40,000, to manufacture and deal in builders' supplies and carry on a lumbering and mining business, etc. Incorporators, Frank Gordon Light, Norman Alexander McMillan and Peter Shearer, all of Winnipeg.

The Wood Guthrie Company, Limited, Toronto, Ont., incorporated with a capital of $100,000, to carry on business as builders and general contractors. Provisional directors, Lewis Miller Wood, Geo. H. Gordon and Orlando H. Linton, all of Toronto.

Marchment Limited, Toronto, Ont., incorporated with a capital of $40,000, to carry on business as sanitary engineers, manufacturer and general contractor. Provisional directors, Samuel W. Marchment and Wm. Hurst, all of Toronto.

Land Owners, Limited, Toronto, Ont., incorporated with a capital of $40,000, to erect buildings and deal in building materials. Provisional directors, Frederick Jas. Pickman, Harry Ivan Easton and Samuel Upton Smith, all of Toronto.

British North American Construction Co., Ltd., Vancouver, B. C., incorporated with a capital of $100,000, to carry on business as builders, contractors, dealers in stone and other building materials.

McDiarmid & Clark, Limited, Brandon, Man., incorporated with a capital of $150,000, to carry on business as lumber and timber merchants, sawmill owners and dealers in wood and timber of all kinds. Incorporators, Alfred Reginald McDiarmid, John Clark, Dr. John McDiarmid and Arthur Gordon Buckingham, all of Brandon.

Electrical Construction Co., Limited, Vancouver, B. C., incorporated with a capital of $75,000, to sell and deal in electrical, oil, gas or other motive machinery, etc., for production of light, heat and power.

South Vancouver Lumber Company, Limited, Crown Building, 615 Pender street west, Vancouver, incorporated with a capital of $50,000, to carry on business as timber merchants, lumbermen, mill proprietors, etc.

The Fraser Lake Water & Power Co., Ltd., Victoria, B. C., incorporated with a capital of $25,000, to construct telegraph and telephone lines and carry on business as a power company in all its branches.

Ashawota Power Company, Limited, Vancouver, B. C., incorporated with a capital of $10,000, to carry on business as general light and heat and power company.

The Port Moody Building and Trading Company, Limited, Port Moody, B. C., incorporated with a capital of $10,000 to construct and operate waterworks, bridges, reservoirs, tramways, etc.

Gilchrist Brick and Development Co., Ltd., Ruskin, B. C., incorporated with a capital of $30,000, to manufacture and sell brick, tile, sewer pipes, hollow blocks, terra cotta and other building materials.

The Industrial and Manufacturing Co., Ltd., Montreal, Que., incorporated with a capital of $250,000, to manufacture and deal in electric, mechanical and hydraulic machinery, railway and mining engineers' supplies, etc. Incorporators, Leopold Barry, Edward Arthur Barnard and Real Robillard, all of Montreal.

Desbarats Realty Company, Limited, Montreal, Que., incorporated, with a capital of $100,000, to construct and maintain roads, streets, waterworks, etc. Incorporators, Wm. Amable Desbarats, Chas. H. Desbarats and Edward Desbarats, all of Montreal.

Rosemont Realty, Limited, Ottawa, Ont., incorporated with a capital of $250,000, to carry on business as general builders and contractors. Incorporators Robert Stanley Minnes, Donald J. McDougall and George Patrick Brophy, all of Montreal.

MacLean Daily Reports

The only systematic method yet devised for reporting BUILDING AND ENGINEERING projects from their inception to completion. Ask us for Rates and Specimen Reports.

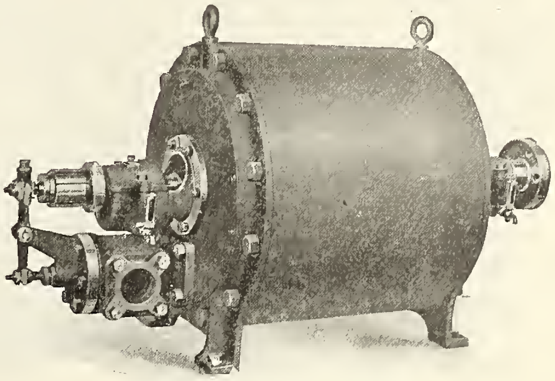
220 King Street West - TORONTO

Kerr Turbo-Pumps

for Power Plants

Kerr Turbo-Pumps are in a class by themselves for feeding boilers, circulating condenser water, for fire service, general water supply, etc.

A Kerr Turbo-Pump is simplicity itself compared to any single or duplex reciprocating pump —smaller, no unbalanced parts, fewer places to use oil and waste, no adjustable parts to get out of order, no close fitting parts inside where wear can increase the consumption of steam, and always ready to start on short notice. There is no clicking noise, no vibration to necessitate a heavy foundation, and above all *no oil gets into the exhaust steam.* If interested, ask for Turbo-Pump Bulletin No. 20.



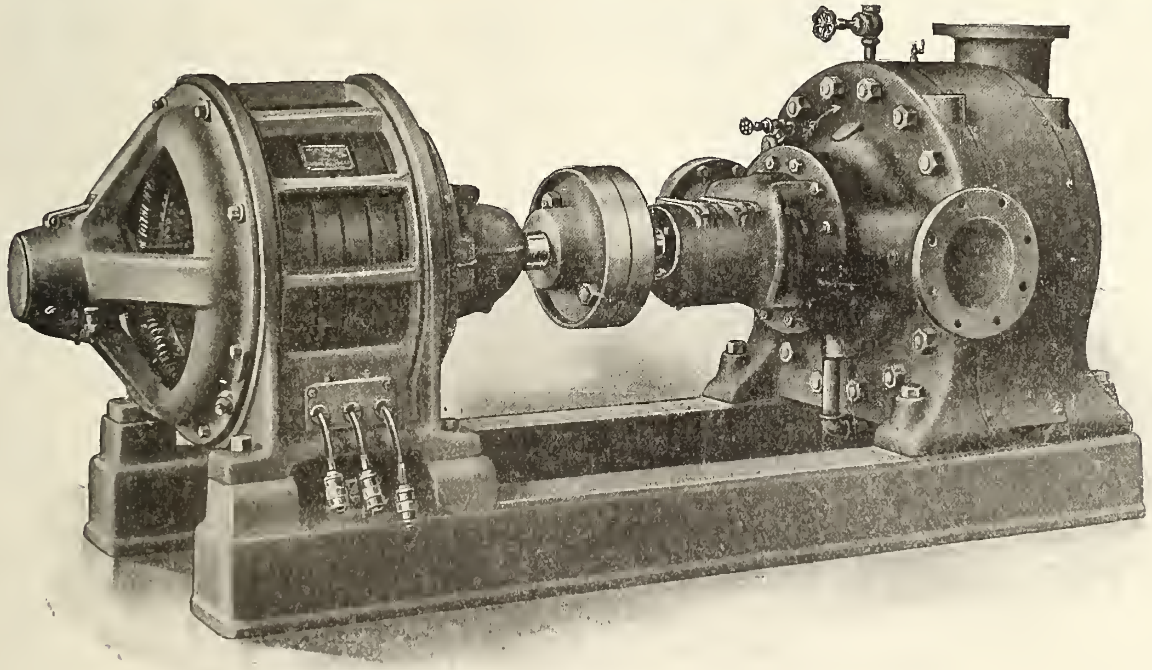
Kerr Steam Turbine

THE JOHN McDOUGALL
CALEDONIAN IRON WORKS CO.
LIMITED

WORKS: **512 WILLIAM STREET, MONTREAL**

Sales Offices: MONTREAL TORONTO COBALT WINNIPEG CALGARY VANCOUVER

Electrically Operated Turbine Pumps for All Duties



CANADA FOUNDRY COMPANY, Limited

TORONTO MONTREAL HALIFAX OTTAWA COBALT WINNIPEG CALGARY VANCOUVER NELSON

SCANDINAVIA
FEDERAL ENGINEERING & SUPPLIES LIMITED
TORONTO
BELTING

FOR

Conveying

AND

Transmission

Good in WET and DRY Places

Write for further information

FEDERAL ENGINEERING & SUPPLIES, LIMITED

Head Office, 284 Yonge Street, Toronto   Branch Office, 329 St. James Street, Montreal

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FILE YOUR PLANS

Free of charge at any of the four offices of the

"CONTRACT RECORD"

Contractors and manufacturers of building, municipal, railway, and power plant equipment not only expect to see your tenders advertised in the "Tenders' Department" of the "Contract Record," but they will also find it a great convenience if you place your plans and specifications on file at any or all of our four offices, viz. Toronto, Montreal, Winnipeg and Vancouver.

Send along your next Tender Advt. together with Plans and Specifications

CONTRACT RECORD

220 King St. West, TORONTO

MONTREAL	WINNIPEG	VANCOUVER
Board of Trade Building	Travellers Building	Crowe & Wilson Chambers

Have You Seen Our New

CATALOG?

It's a beauty, and the largest and best catalog of

Hoisting Machinery

ever published in Canada.

And why should it not be the Best Catalog, for does it not describe the Best Hoisting Machinery made in Canada?

This book also shows a splendid assortment of Derricks and Derrick Parts, Steel Buckets, Steel Skips and Steel Cars, and many other articles used in connection with Hoisting Machinery.

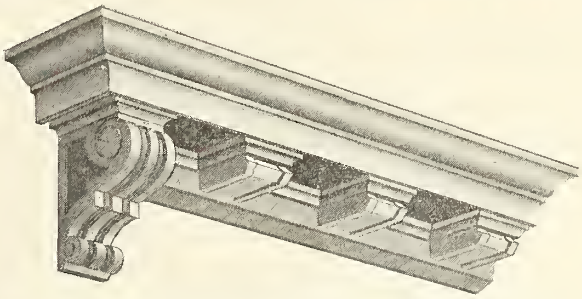
If you are interested in these goods drop us a line, so we may mail you one of these fine catalogues. You will not be sorry.

Marsh & Henthorn, Limited
Belleville, Ont.
Makers of Hoisting Machinery
Sales Agents: MUSSENS Limited, Montreal

WRITE FOR OUR

Galvanized Cornice

CATALOGUE

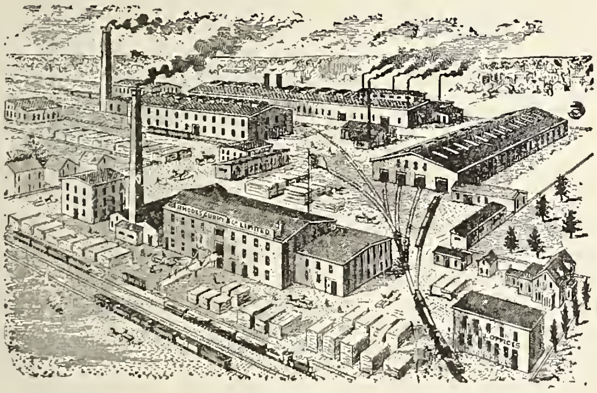


We illustrate scores of designs from which to choose or which will give you suggestions from which to design your own cornice.

Catalogue or special designs executed promptly by thoroughly competent workmen.

The Metallic Roofing Co. LIMITED
Manufacturers
TORONTO, ONT. WINNIPEG, MAN.
(46)

Rhodes, Curry Co., Limited
Lessees



Bank and Office Fittings

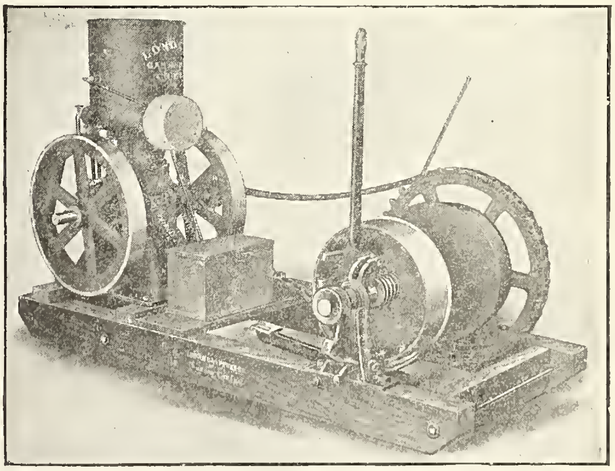
SCHOOL DESKS A SPECIALTY

We manufacture all kinds of building materials, including cast iron columns, cresting, sash weights, etc.

In addition to our large stock of native lumber, we are now carrying about one million feet of foreign lumber, including oak, walnut, ebony, whitewood, basswood, red cedar, Douglas fir, mahogany, &c.

Rhodes, Curry Co., Ltd. Amherst, N. S.
BRANCHES AT
Halifax Sydney

Do You Want a Good Hoist?



Patent Applied For

"London" Friction Clutch Hoist

Here are a few of its many uses

Contractor's Work	Mortar Conveying	Well Digging
Bridge Building	Sewer Building	Pile Driving

This hoist can be used with any make or style of gas, gasoline or oil engine

The London Gas Power Co., Limited
Engineers and Machinists London, Canada

PURE WATER

It is easy to obtain with our plants and apparatus

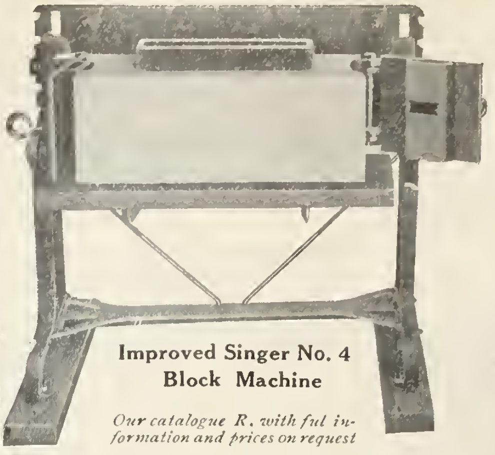
We design and contract for complete municipal filtration plants of any capacity.

We supply and install apparatus for sterilizing water supplies by the application of calcium hypochlorite.

Literature, Sketches, Estimates and Recommendations Supplied on Request

American Water Softener Co.
1001 Chestnut St., PHILADELPHIA, Pa.

We have no affiliations or working acquirements with any of our competitors.



Improved Singer No. 4
Block Machine

Our catalogue R. with ful information and prices on request

It Makes
Face Down Blocks

Blocks 4", 6", 8" 10" 12", 16" and 20" long. 4", 6", 8", 10" and 12" wide.

All Blocks on One-size Pallet.

Sold in combination to suit purchaser at reasonable prices. Guaranteed against defective material or poor workmanship.

Vining Mfg. Co.
Niagara Falls, Ont.

Tenders

A few dollars spent in advertising your proposals in

The Contract Record

would result in additional competition, which might save your city or town or your client many hundreds of dollars.

THEW SHOVELS

STEAM SHOVELS THEW HORIZONTAL CROWDING MOTION LORAIN FULL CIRCLE SWING

The THEW SHOVEL has revolutionized the methods employed for cellar excavating, street grading, road construction, and light contract work in general.

The contractor whose equipment includes one of these light shovels, capable of doing the work of thirty or more laborers and economical if it replaces only four or five men, can underbid the contractor who is not so equipped. He can move a given yardage in a shorter time, at a lower cost, and with less trouble. He is recognized as up-to-date in his methods, is given an opportunity to figure upon the best jobs, and will usually receive the preference, other conditions being equal.

The THEW SHOVEL will handle cuts as shallow as 12 inches and give economical results. It will rip up old macadam and handle rough, stony ground most effectively.

Send for Catalogue. C.R.

THE THEW AUTOMATIC SHOVEL CO., Lorain, Ohio

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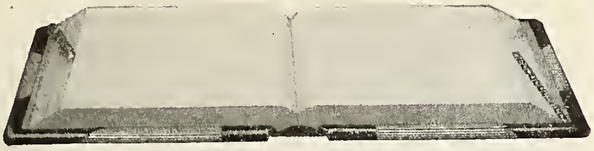

absolutely flat opening gives blank book convenience with loose leaf utility. Will hold securely 1 to 2000 sheets. No metal parts exposed.

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Made in U. S. by Proudfit Loose Leaf Co., Grand Rapids, Mich.

Engines and Boilers

of all types and sizes, Heaters, Tanks, Pumps, etc.

E. Leonard & Sons LONDON ONT.

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Agents for **National Gas Engine Co.**
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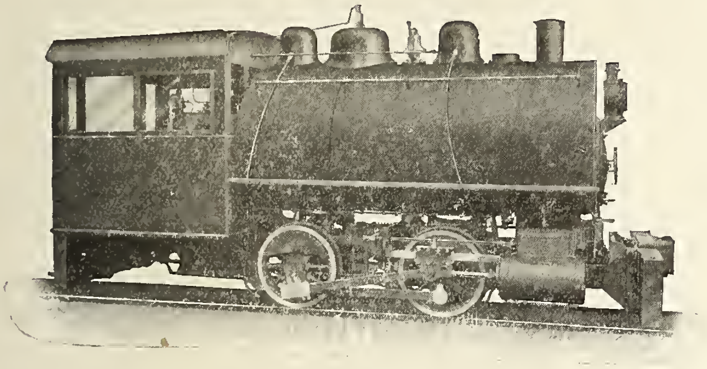
INDUSTRIAL LOCOMOTIVES



Persistent specialization, careful testing of all materials, and painstaking care in manufacturing, have produced our standard locomotives for contractors, quarries, and switching around mines and industrial plants.

These locomotives are the product of engineers and manufacturers who thoroughly understand conditions surrounding their use. These conditions require powerful and sturdy locomotives which will give maximum work for minimum attention. It is important that the boilers should be ample in capacity, and that they should be tight and remain so. Also that the machinery should be rugged for service with ample surfaces for wear. Parts that will wear should be accessible for easy renewal.

Our standard locomotives embody these features, combined with wide experience. To do yourself justice you should investigate them before purchasing,

Spare parts that are sure to fit are always on hand for prompt shipment.

MONTREAL LOCOMOTIVE WORKS, LIMITED

BANK OF OTTAWA BUILDING, MONTREAL, CANADA

Cumberland County Quarries

Red and Grey Freestone

Oakley Myers, Amherst, N.S.

Hardens with Age. Low Price. Samples and Quotations Free

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STONE of any Size and in any Quantity on hand for Sidewalks, Roadwork or Concrete Work

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G. W. ESSERY, Manager

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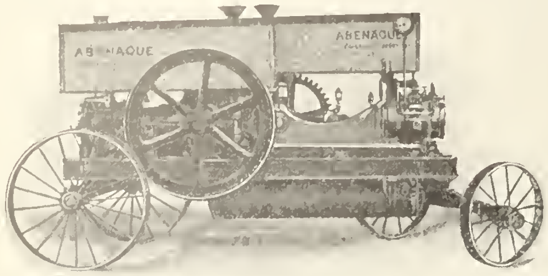
Suitable for Sprinkler Systems Fire Protection, Water Supply Plants, etc.

Steel Substructures of all kinds
(Galvanized or Painted)

Windmills, Gasoline Engines, Hydraulic Rams, Etc.

Ontario Wind Engine & Pump Co.
Limited
TORONTO WINNIPEG CALGARY

$ You Can Save $100 a Day on Many Jobs $



Can You Use the Money

ABENAQUE Portable Air Compressor Outfit

is saving money for every contractor using it. Why not let it do the same for you? Let us talk with you regarding the cost of handling your work with one of our outfits.

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ABENAQUE MACHINE WORKS,
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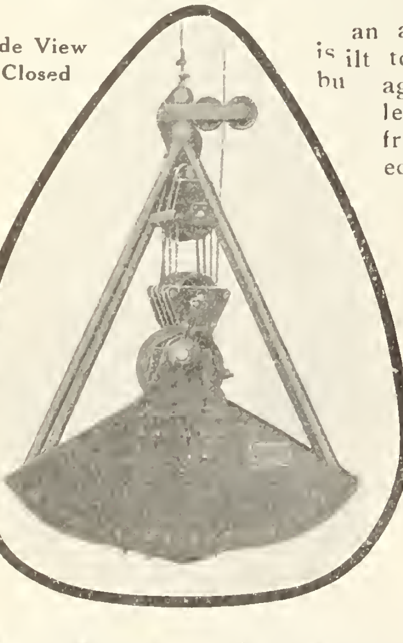
Boston Office, Post Office Square Building, Boston, Mass.

The

Owen Bucket

Side View
Closed



an all round bucket, is built to stand hard usage. It will handle any material from sand to crushed rock.

The Owen Bucket will dig like a steam shovel and is provided with detachable teeth for dredging.

Write for our catalogue fully descriptive and a positive guarantee with every bucket.

The Owen Bucket Company

529-531 Rockefeller Building
Cleveland, Ohio

Take the Best Care of Your Horses, it will Pay You

Johnson's Reliable Veterinary Remedies

will give you better satisfaction for less money than any other preparations on the market. They are being used by most of the large horse owners throughout Canada—particularly by the Lumbermen and Railway Contractors.

The lines that are selling best are:

Johnson's Horse Liniment, No. 1 (Alcoholic)

1 gal. jugs (Imperial)	$1.50 gal.
1 lb. bottles	8.00 doz.
2 lb. bottles	15.00 dod.

Positively the best all round Horse Liniment made.

Johnson's Horse Liniment, No. 2 (an oil liniment)

1 gal. jugs (Imperial)	3.00 gal.
1 lb. bottles	6.00 doz.
2 lb. bottles	11.00 doz.

Johnson's Horse Colic Remedy

A sure and speedy cure for all kinds of Colic

1 gal. jugs (Imperial) 40 doses	5.00 gal.
1 lb. bottles 4 doses	8.00 doz.
2 lb. bottles 8 doses	15.00 doz.

Johnson's Veterinary Healing Ointment (Gall Cure)

2 lb. tins	2.00 per tin
4 oz. tins	3.50 doz.

Johnson's Condition Powders (Concentrated)

1 lb. packages	3.60 doz.

A full supply of all drugs and patent medicines at lowest wholesale prices.

Have you ever used for your men

Johnson's Mosquito Oil 1.75 doz., 1800 per gross
It positively does the trick

Our prices are lower than those of all other manufacturers. Letter orders receive prompt attention.

A. H. Johnson, Wholesale Druggist, **Collingwood, Ont.**

Leaded Art Glass

Have you a copy of our Catalogue?
Write nearest office.

The Hobbs Mfg. Co., Limited

FACTORIES AND WAREHOUSES:
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ERIE MACHINE SHOPS

P. W. DIETLY
Proprietor

"Our 20th Century Roller"

Send for our Catalogue of Asphalt Rollers and Mixers.

1303 PEACH STREET - ERIE, PA.

The Mullen Combination Tar Kettle and Gravel Heater

A Money Maker for Contractors

Is on wheels and can be easily moved about. Supplies hot gravel and hot tar from the one fire.

Write us for particulars

Tide Water Iron Works

HOBOKEN, N. J., U. S. A.

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Builders' Supplies

Head Office:
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- Grey Lime
- White Lime
- Hydrated Lime
- Portland Cement
- Atlas White Cement
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- Waterproofing Cement
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- Hard Wall Plaster
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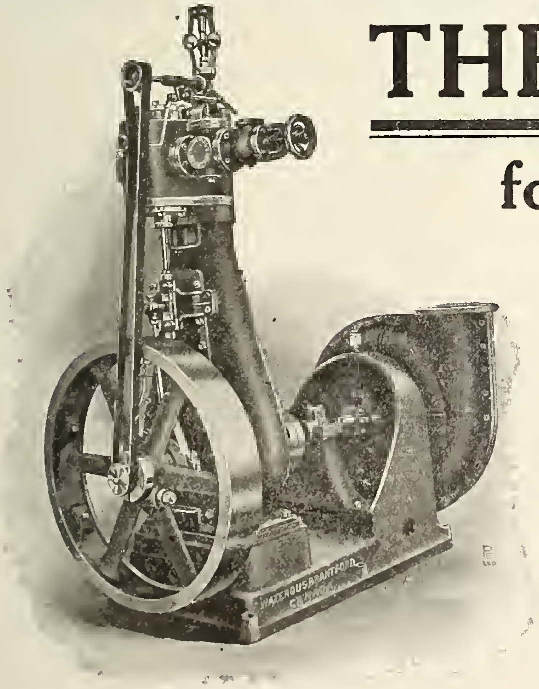
- Mortar Colors
- Weeping Tile
- Sewer Pipe

We can make immediate delivery of any of the above materials from any one of our branch yards. Would be pleased to have your order.

THE PUMP

for the General Contractor



In this pump and engine we offer a pumping outfit that for simplicity, strength and general efficiency cannot be bettered.

The pump section is our standard pump design with reversible runner, rim split shell, bronze packing gland and split base. **The engine**, direct connected to pump, is a vertical high-speed single crank type, entirely enclosed and self oiling, fitted with "Sweet" balanced and double-ported slide valves and built on duplicate part system.

Simple to install and to operate this pump unit requires small space and can be depended upon to work full shift day after day with little attention, other than occasional overhauling for cleaning and lubrication. Built in nine pump sizes, from 4-in. to 14-in. diameter discharge opening.

Write for Descriptive Bulletin No. 201

The Waterous Engine Works Co., Limited

Brantford, Canada

Note tremendous metal weight on this floor. Entire building of Alsen's Cement reinforced concrete

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
45 BROADWAY, NEW YORK

ANOTHER TEST

Put on a wall two sheets of lath, one the ordinary kind and one of Herringbone. Mix your plaster too wet and without sufficient hair. By varying your mix you will easily find a plaster which will drop badly from the back of the ordinary lath but will not drop from the Herringbone.

Herringbone Lath gives the best key

CLARENCE W. NOBLE
General Sales Agent
117 Home Life Building, Toronto
Metal Shingle and Siding Co., Manufacturers

Merriman One-Car Asphalt Plant

The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.

Many special features. Write for full particulars.

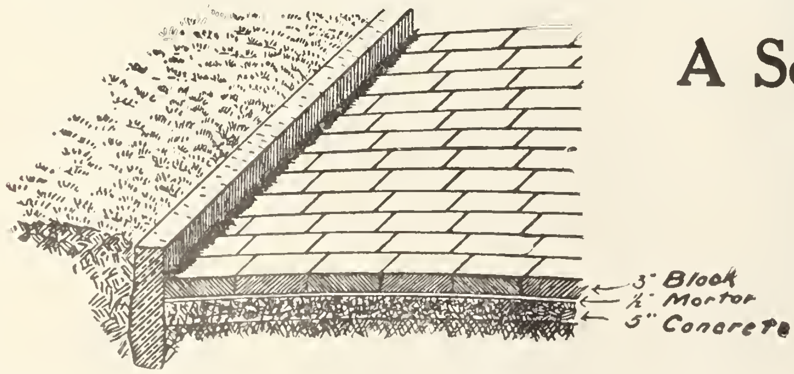
Also Asphalt Mixers
East Iron & Machine Company, Lima, O., U. S. A.

EVERYTHING YOU WANT
in a Factory Site:

Water, drains, sidewalks, gas, electric power, tramways, three railways, police and fire protection and all Montreal's facilities

at

Maisonneuve, Que.



A Scientific Pavement
must be

Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by
Asphalt Block Pavements
Send for Descriptive Literature

The Ontario Asphalt Block Company, Limited - Windsor, Ont.

for Highest Efficiency, Absolute Reliability, Greatest Economy

Used by the Largest Mining Companies and Hydro-Electric Plants. Also Extensively for Dredging, Exhaust Steam, Compressed Air, etc.

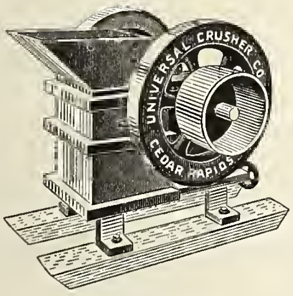
Sizes 3 to 42" Diameter up to ¼" in thickness
Easily installed and securely connected with our Forged Steel Flanges or All Steel Bolted Joints.

Write for our Catalogue 5-A and prices on your requirements

AMERICAN SPIRAL PIPE WORKS — MAIN OFFICE—CHICAGO
NEW YORK OFFICE—50 Church Street

The Universal Crusher

Because of its Forced Feed and Forced Discharge the Universal is SUPERIOR FOR FINE AND UNIFORM CRUSHING To Any Other Machine in the World.



The Famous
Forced Feed Crusher
Made in All Sizes

Instantly adjustable to crush to any size, from 3 in. down to ¼ in. and finer. Enables you to make any size material at once without the expense of handling over-size or under-size.

The forced feed action gives a maximum capacity, using **half the power** of other makes.

GUARANTEE

30 day's trial to your heart's content **on any material.** If it should fail to do the work as agreed, your money cheerfully refunded. If you can suggest any fairer proposition, tell us what it is.

The Universal Will Save You Hundreds of Dollars

Write for particulars to

UNIVERSAL CRUSHER COMPANY
500 F. Avenue :: :: CEDAR RAPIDS, IOWA

A Stucco or concrete house needs protection with the original

BAY STATE
BRICK AND CEMENT COATING

The coating prevents discoloration or cracking from moisture and does not destroy the pleasing texture of the concrete or stucco. It has been endorsed by the National Board of Fire Underwriters as a fire retarder and is a perfect protection as well as a beautiful tint for the exteriors or interiors of residences, hotels, garages, factories and mills.
ON FLOORS it stands wear and washing and does not disintegrate.
Let us send you a book which tells all about it and a list of the well known homes, hotels, mills and factories on which it has been used. Address, mentioning this medium.

Wadsworth Howland & Co., Inc.
Paint and Varnish Makers and Lead Corroders
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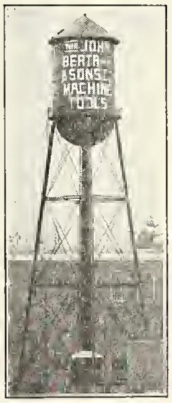

The Des Moines Hemispherical Bottom Steel Tanks and Towers

have been used and approved by nearly all leading Engineers. They are undoubtedly the most economical means of storing water at an elevation.
We have built many of these in Canada the United States and Mexico.
Estimates cheerfully furnished.

Send for Catalog No. 15

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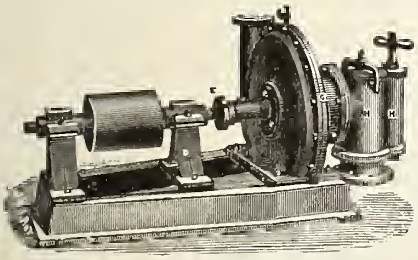
F. H. Hopkins & Company, Canadian Representatives, Montreal, Quebec

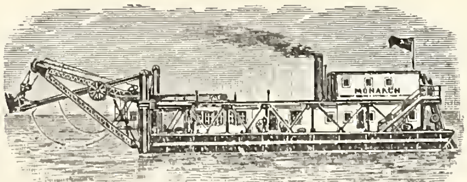
M. Beatty & Sons, Limited Welland, Ontario, Canada

Dredges, Ditchers, Derricks, Steam Shovels



Steel Dump and Deck Scows

Submarine Rock Drilling Machinery
Mine Hoists, Hoisting Engines
Centrifugal Pumps, Clam Buckets
Steel Skips, Coal and Concrete Tubs
and other Contractors' Machinery.



When you think of Metal Ceilings think of GALT

A Contractor needs our Metal Ceilings—Because they can be erected

By ANY Carpenter
At ANY Time of the Year
In ANY Kind of Weather

Plans, Instructions, Wood Bracket and Nails Furnished Free.

Get Catalogue A-3

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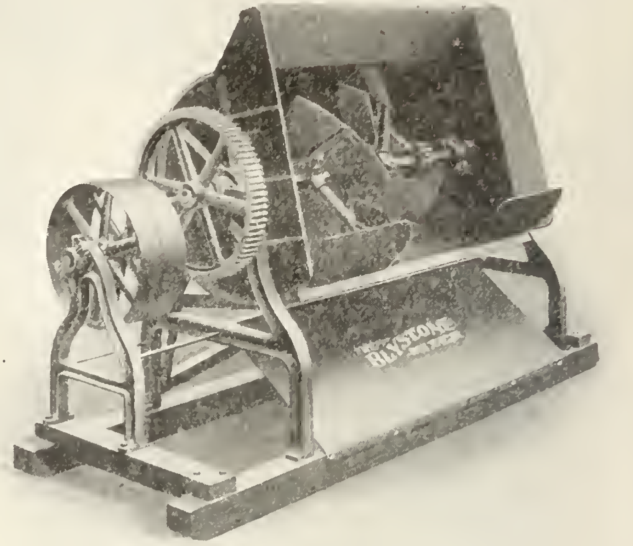
GALT, ONTARIO

BLYSTONE MIXERS

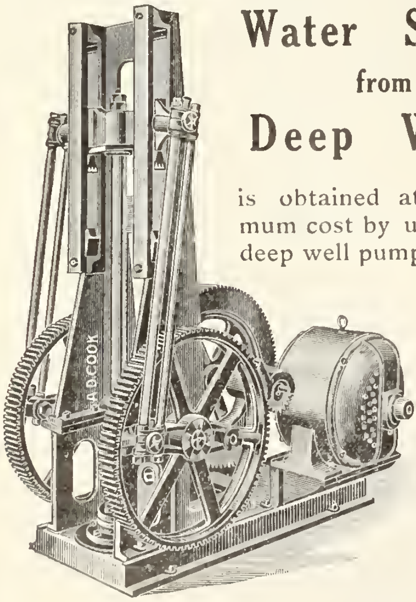


BLYSTONE SKID MIXER

showing the Batch Mixer on skids for shop use. In position for discharging the material.

This machine is equipped with speed reducing gear, tight and loose pulleys, and can be belted direct to the power. Simple, efficient and easily cleaned. Specially well adapted for Brick, Block or Tile plants. The Blystone Batch Mixer is also mounted on hand trucks and mounted with power for outside use.

The Blystone Machinery Co.
51 RAILROAD STREET
Cambridge Springs, Pa., U. S. A.



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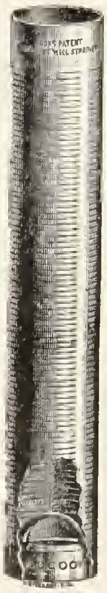
is obtained at a minimum cost by use of our deep well pumps.

Write for Bulletin 26 explaining the use of Cook's Patent Brass Tube Well Strainer



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Lawrenceburg, Indiana, U. S. A.

Manufacturer of a Complete line of **DEEP WELL SUPPLIES** including Steam, Belt and Motor Driven **DEEP WELL PUMPS**, Wind-mill and Hand Pumps, Working Barrels and Valves, Pump Rods and Pump Rod Joints, Drill Rods and Drill Rod Joints, Drilling and Well Tools.

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Producers of Dark Hollow Buff and Blue
Hunter Buff and Blue Oolitic Limestone

Celebrated

Bedford Stone

from our quarries has been used in many of the largest public buildings, churches, etc., in the United States and Canada.

Mill blocks, sawed, planed and turned stone of every description furnished on short notice. Write for information.

General Offices
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Do you know about our Service?

Are you aware that it is the most efficient and economical way of locating profitable business?

Do you know that you can have a resident agent in every town in Canada for a purely nominal sum each year?

Do you know that you can eliminate oversight, loss of opportunity, that you can increase profits, cut costs by using our reports?

And that specimen reports, rates and full information will be supplied upon request?

MacLean Daily Reports Limited
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What Lime Do You Use?

RENFREW?

If you don't, you are missing an opportunity of saving 75 cents a day on each bricklayer, and of laying 200 more bricks a day.

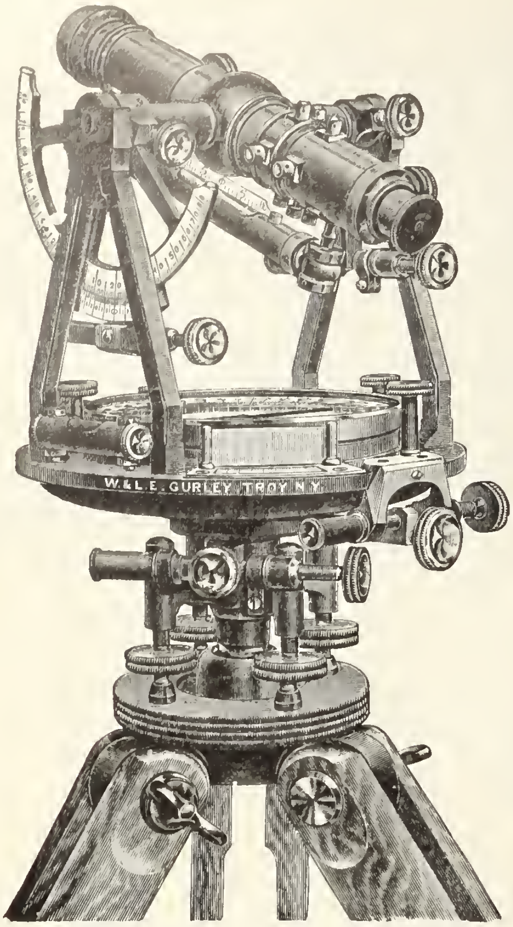
'Renfrew' Lime requires less time for tempering. Does not set so rapidly and allows the bricklayer to spread for more bricks.

'Renfrew' the Lime of Quality

Jamieson Lime Co.

RENFREW, ONTARIO

White Lime - Stone - Grey Lime
Brick - Drain Tile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1845 1911

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Field Instruments

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Transits
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Branch Factory: Manufacturers Exchange Building. Seattle, Wash.

Latest edition of Gurley's Manual sent on Application.

"Consol" Transits and Levels

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The experience of twenty years in the construction of Optical Instruments, demanding accuracy and precision, combined with the best manufacturing facilities on the Continent, enable us to place in the hands of Canadian Engineers and Contractors the finest line of instruments at a less price than is possible to importers. Transits, Builders and Architects' Levels and a full line of accessories are always available, or made to special order.

Our instruments are made entirely in our own factory and are specially designed to meet the requirements of Canadian conditions.

A skilled staff enables us to execute any kind of repairs promptly and satisfactorily.

Consolidated Optical Company Limited

400 Richmond Street West, Toronto

No. 22

Reconnoissance Transit

The L. Beckmann Co.

Manufacturers of Up-to-Date Surveyors,
Engineers, Contractors Instruments.

Send for our Catalogue

TOLEDO, OHIO Instrument Makers for 37 years **U. S. A.**

DO YOU WANT?

Anything in the line of PIPE for Sewer or Culvert Work.

If so we have a stock of **Concrete Pipes** some thousands of feet of A 1 Quality from 6 to 45" diameter in quantities of 100 to 1000 feet.

We are bound to close them out as we must keep our plant going.

Therefore this is your advantage. A genuine money saving opportunity that seldom comes your way.

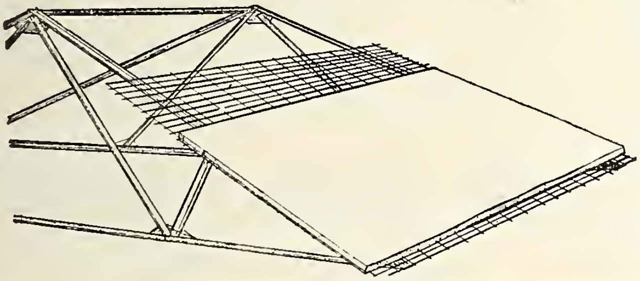
Remember **Superior Quality Concrete Pipes** and they are going to be moved.

Write your requirements to-day

Ebenezer North Co.

LONDON, ONTARIO

Concrete Reinforcement

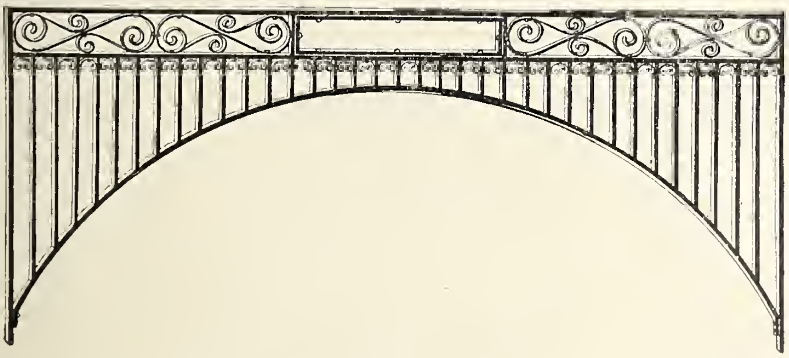


Our Bonding is a Crimped STEEL WIRE Fabric

Can be made in any Length or Width to suit you.

We claim in the erection of roofs and floors our continuous reinforcement has no superior, inasmuch as it knits the entire mass into an actual monolithic slab, weak at no point and so tied together that in case of accident from any cause whatever, no single section would fall but would be sustained by carrying capacity of wires running in continuous lengths over top of roof trusses or purlins

Inquiries Solicited



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Ornamental

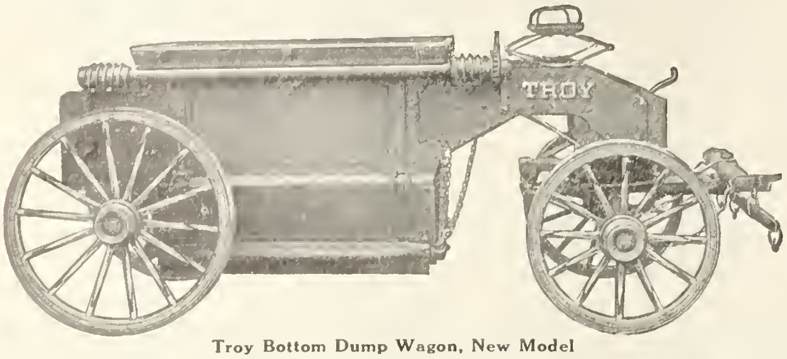
Wire and Iron Work

SEND US YOUR ENQUIRIES

We specialize in

Jail and Prison Work

Canada Wire & Iron Goods Co., Hamilton



January 1st — Resolution Day

Troy Bottom Dump Wagon, New Model

Resolve to do your hauling cheaper than you did last year.

Use TROY Specials and get your costs down to rock bottom. Your teams can make more trips the Special is lighter running. Your men can load it quicker—it's lower down. And it never can get out of order. The price is **Right.**

Get Catalog 22

The Troy Wagon Works Co.
North Market St.
TROY - OHIO

The
Missisquoi Marble Company
Limited

Canada's Pioneer and Leading Concern in the Marble Business

They will sell you Quarry Blocks, Sawn Marble, Marble completely finished for either interior or exterior purposes, and, if necessary, they will contract to set it in place.

Samples may be seen at District Sales Offices:—

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Hardwood Flooring
Interior Trim
Veneer Doors
Pine Doors
Stairs Frames
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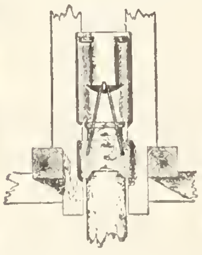
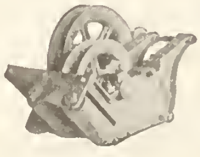
We manufacture the above from Select Stock : :

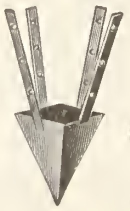
J. R. Eaton & Sons
Limited
Orillia, Ontario

PILE DRIVERS
VULCAN IRON WORKS CHICAGO ILL., U.S.A.
Station D

Steam Hammer


Casgrain Pile Cap


Perfect Head Block



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Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
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		Star.	D.D.
10 to 25	united inches........	$4.25	$ 6.25
26 to 40	"	4.65	6.75
41 to 50	"	5.10	7.50
51 to 60	"	5.35	8.50
61 to 70	"	5.75	9.75
71 to 80	"	6.25	11.00
81 to 85	"	7.00	12.50
86 to 90	"	...	15.00
91 to 95	"	...	17.50
96 to 100	"	...	20.50
101 to 105	"	...	24.00
106 to 110	"	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.50	$ 6.75	$ 5.25
40 u. i.	4.25	3.75	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts —Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

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Hot water boilers, 50 and 10 per cent.; hot water radiators, 50 and 10 per cent.; steam radiators, 50, 10 and 2½ per cent.; wall radiators, 50 and 10 per cent.; specials, such as angles, curves, etc., 25 per cent.

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Iron Pipe

(per 100 ft.)	Black		Galvanized
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.03	⅜ inch	2.86
½ inch	2.63	½ inch	3.48
¾ inch	3.05	¾ inch	4.28
1 inch	4.37	1 inch	6.02
1¼ inch	5.96	1¼ inch	8.21
1½ inch	7.16	1½ inch	9.86
2 inch	9.18	2 inch	12.78
2½ inch	16.10	2½ inch	21.85
3 inch	21.14	3 inch	28.69
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 40 per cent.

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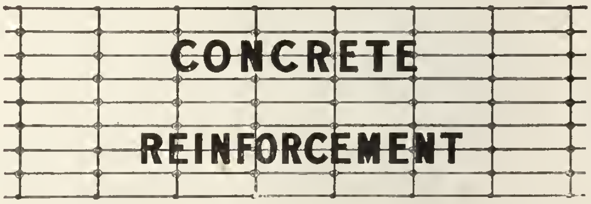

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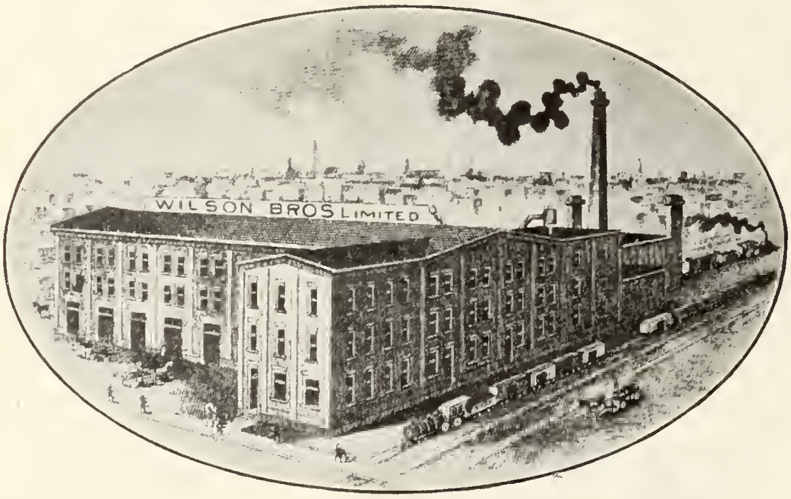

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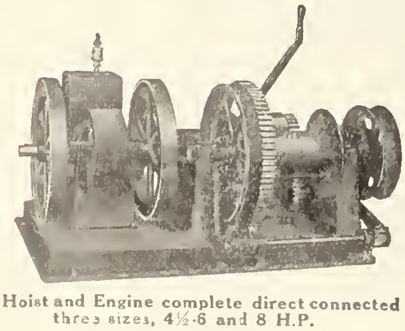

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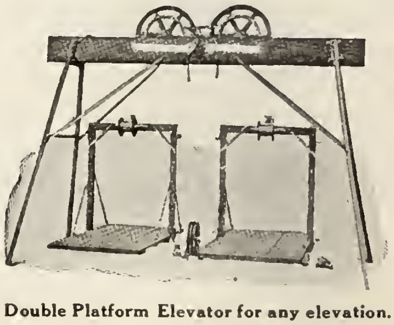
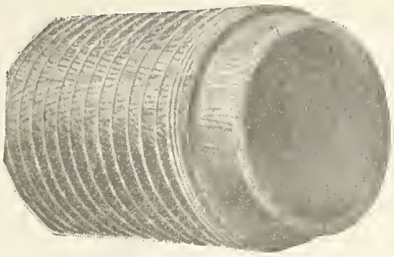


Double Platform Elevator for any elevation.



Galvanized Wire Wound and Continuous Stave Wooden Pipe

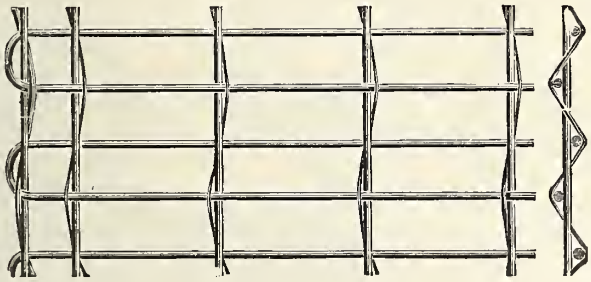
FOR
Municipal and Private Water Supply
Direct Pumping or Gravity Systems
Power Lines, Irrigation and Mines
WILL NOT
Rust, Rot, Burst, Freeze or Taint

Withstands 200 lbs. Working Pressure
Unaffected by Acids or Minerals

Tanks, Water Works Supplies, Complete Water Systems Installed

WRITE US

The EASTERN PIPE AND CONSTRUCTION COMPANY, LIMITED, Alexandria, Ontario



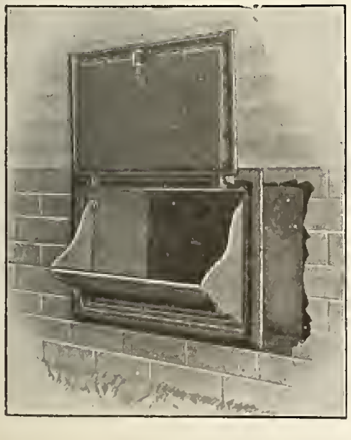
WIRE LATHING

Consider the advantages of Greening's Wire Lathing. It is fire proof, rat proof, shrink proof, warp proof. The key is perfect. The plaster cannot become detached from the lath as it clenches through mesh forming a double coat of plaster. Greening's Wire Lathing is particularly adapted for use in stores, factories and warehouses where the vibration of machinery or the moving of heavy weights is liable to shake the plaster off ordinary wood lathing.

Every Builder and Architect should have our Lath and Wire Reinforcing Catalog.

WRITE FOR CATALOG NO. 6

The B. Greening Wire Company, Limited
HAMILTON, ONT. - MONTREAL, QUE.



EQUIP YOUR CELLAR

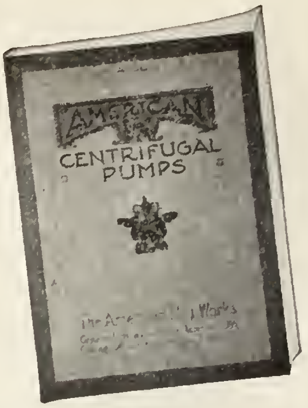
with one of our "Majestic" Coal Chutes which is the neatest and best equipment for any cellar. It is easily installed in either new or old houses. It permits coal, wood or vegetables to be put into the cellar without disfiguring the building in any way. And unlike a glass window it cannot be broken. The hopper can easily be removed if desired to put in very coarse coal or wood, or if a waggon chute is used. It swings back into the chute and allows the door to be closed. The door is made to lock when opened upward, and protects the wall or siding above the chute, and can be released only when closed. We make three standard sizes. There's a size that's just right for your cellar and your requirements. No. 1—22 x 16 x 13 No. 2—27 x 16 x 13 No. 3—33 x 22 x 18

Send for our illustrated booklet, it shows and describes our full line of Coal Chutes

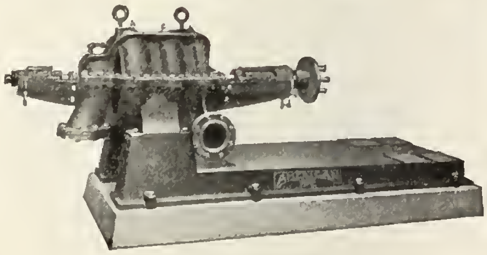
The Down Draft Furnace Co., Limited
Galt, Ontario, Can.
Montreal Representative: E. F. Dartnell, No. 8 Beaver Hall Square.
Gorman, Clancey & Grindley, Agents, Calgary and Edmonton, Alberta.

Why "American" Centrifugals

Are Most Economical in the Widest Range of Pumping Conditions.



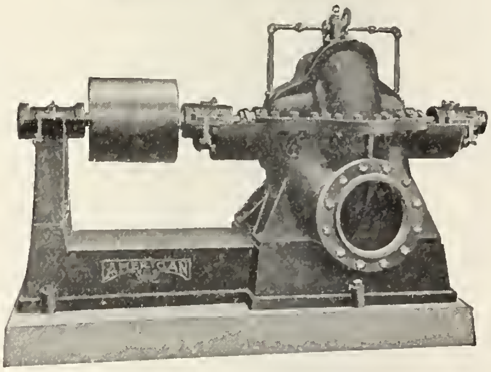
The reason why "American" Centrifugals are unequalled for economy is that they represent the highest development of the most modern type of pump and there are the best of reasons for this higher development.



Instead of building a single type of centrifugal and recommending it for every purpose "American" centrifugals are built in over fifty distinct types and every size of every type is carefully tested in our own complete hydraulical laboratory and its efficiency proved before it is permitted to leave our works.

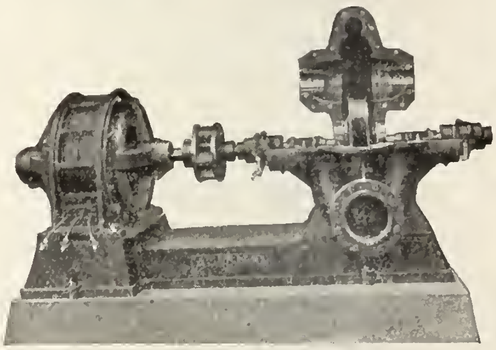
It must meet our standard of efficiency before it is allowed to leave our works and that is what is making the American trademark famous in pumping machinery.

AMERICAN



"American" centrifugals attain up to 80 per cent. mechanical efficiencies and many of our specially designed pumps, installed according to our own specifications, show much higher efficiencies, enabling them to operate against high heads. We have many single stage centrifugals installed operating on over 200 feet heads.

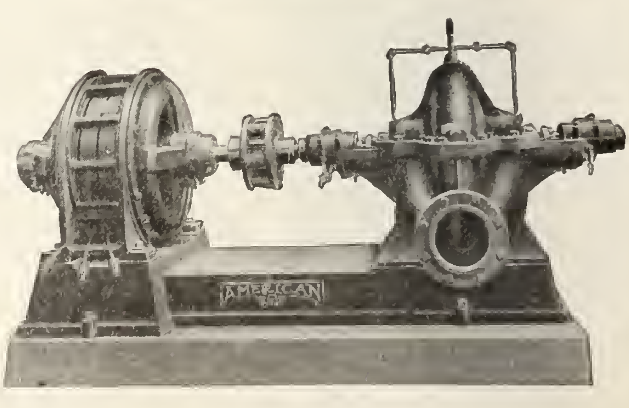
The low first cost of "American" centrifugals as compared with old style plunger pumps, combined with their high efficiencies, low cost for attendance and small cost for repairs make them **far more economical** than any other type of pump in nearly all conditions where **all costs are considered.**



Greatest economy in the end is the claim we make for "American" centrifugals and we are ready to prove that claim.

If you are interested in irrigation, write for our booklet, "Irrigation by Pumping" Bulletin No. 118.

Our General Centrifugal Pump Catalog No. 117 is the most complete ever issued. Write for it today.



The American Well Works

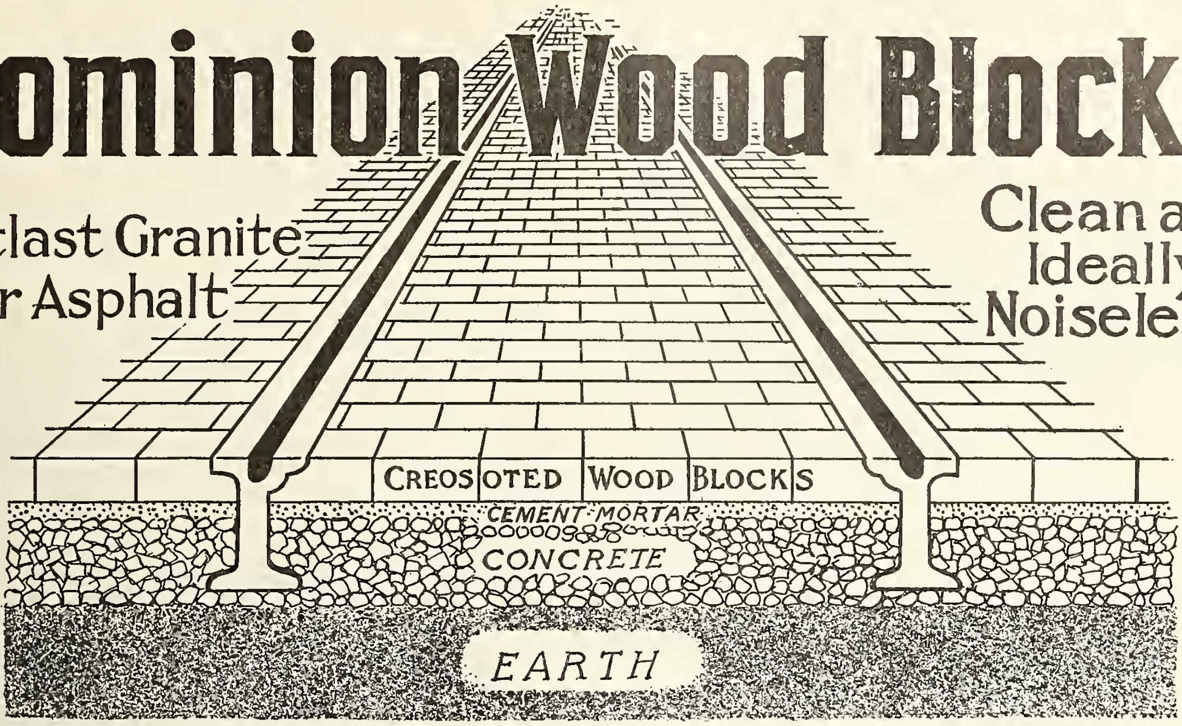
General Office and Works: Aurora, Ill., U. S. A.
Chicago Office: First National Bank Building

Canadian Sales Agency
231 Craig Street West, Montreal
441 Seymour Street Vancouver, B.C.

Dominion Wood Blocks

Outlast Granite or Asphalt

Clean and Ideally Noiseless



Dominion Wood Blocks

make the most durable pavement for all classes of service, from the lightest wear of boulevard vehicles to the grinding of the heaviest trucking traffic. It is the one pavement that won't need the annual attention of the repair gang and will pass out of reserve in perfect condition.

Don't put your money in a pavement that will need patching before the final payment is made on the assessment.

Dominion Creosoting Company
LIMITED.
BOX 143
Vancouver B.C.

Vault Doors and Safes

J. & J. Taylor

Toronto Safe Works

Established 1855 **TORONTO**

Branches: Vancouver and Winnipeg
Montreal

Carey's Flexible Cement Roofing

When Carey's Roofing is specified and used, roof quality, durability and satisfaction are assured. Its standardized construction is recognized everywhere—proved by twenty-five year tests.

Furnished and applied—under our direct supervision and guarantee—to any class of buildings, flat or steep surface.

Write for full particulars.

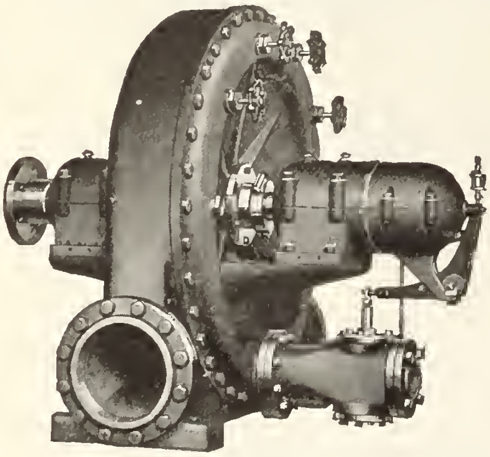
The Philip Carey Mfg. Co.

50 Branches Established 1873

60 Wayne Avenue, Lockland, Cincinnati, O.

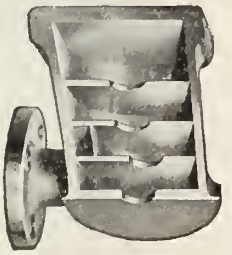
Sturtevant

The Economical Steam Turbine



One of the Secrets of Slow Speed Economy
The Sturtevant Supplementary Bucket

Our new catalog 190z describes and illustrates the new Sturtevant features which make this turbine the most economical of its size on the market today. Send for this new catalog 190z.



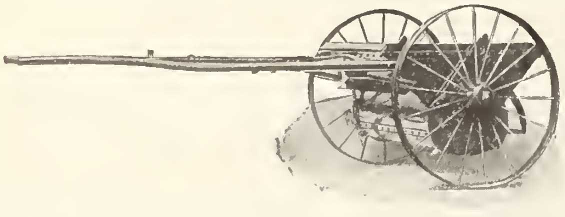
Lower Water Rates by our New Patented Devices

B. F. STURTEVANT CO., - HYDE PARK, MASS.

Offices in all principal cities.

881

Concrete Spreading Carts — Controllable Discharge



The cart is a modification of our controllable centre Dump Bucket, mounted on wheels and equipped with shafts, etc., for hauling with a horse.

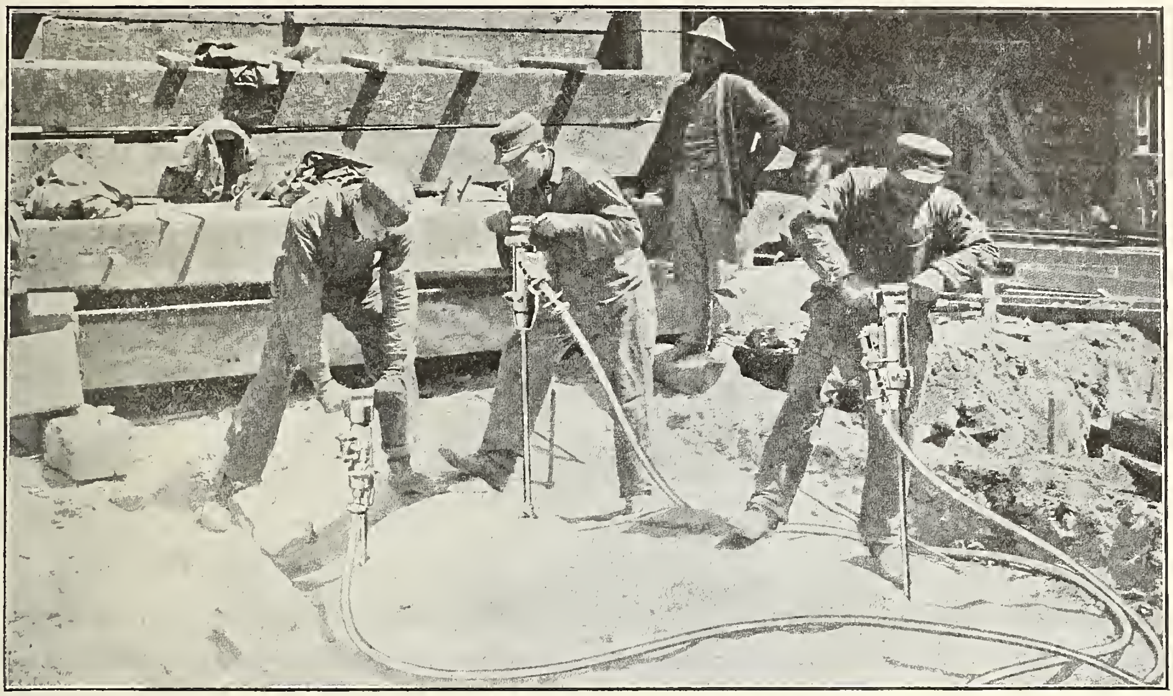
The load is under perfect control at all times.

SEND FOR OUR CATALOGUE

THE ACME EQUIPMENT & ENGINEERING COMPANY

Our Equipment is Manufactured in Canada for Canadian Trade **Garfield Building, CLEVELAND, OHIO**

The McKiernan-Terry Class "B" Hammer Drill



"Three "Busy Bees" at work on the New York Subway Excavation"

Are you sinking a shaft?
Would you like to do it cheaper and faster?
If so, follow the method used by the contractors in New York, who are putting down the big shafts for the Subway Excavation.
They are using "24 McKiernan-Terry Class "B" Hammer Drills"
They call them "BUSY BEES."
These drills will put down 8 ft. holes, either *wet* or *dry*.
They will bore about twice as fast as the reciprocating rock drill.
They use half as much air.
They require no setting up.
There is no time wasted.
They are BUSY all the time.
They are the last word in a shaft sinking tool.
BUY ONE AND TRY IT.

Canada Foundry Company, Limited

Cor. King and Simcoe Sts., TORONTO

District Offices:
Montreal, Halifax, Ottawa, Cobalt, Winnipeg, Calgary, Nelson, Vancouver, Prince Rupert

The Mushroom System

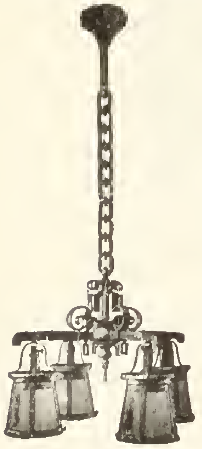
Of Reinforced Concrete is strong, economical and durable. Based on scientific principles, every pound of steel does the work it is designed to do.

The system is fully covered by broad patents in Canada, the United States, and all civilized foreign countries.

For lists of buildings, descriptive literature and estimates, address

C. A. P. Turner, M. Am. Soc. C. E.

816 Phœnix Building, Minneapolis, Minn.



MODERN GAS FIXTURES

MODERN gas lighting means the use of efficient and artistically beautiful gas lamps obtainable at the present time, in distinction from the common ordinary open gas flame. This improvement is all due to the wonderful scientific discoveries of Dr. Auer Von Welsbach, whose name is now a household word wherever light is used.

Builders, home owners and architects are realizing as never before the need of a uniform system in home and building illumination, straight gas or combination gas and electric fixures are now looked upon as the ideal. We want every person interested in home building to consult us about this question. Don't wait until you're sorry.

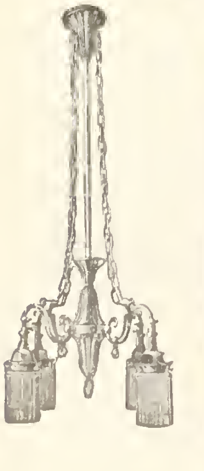
CONSULTATION FREE

DEMONSTRATION AND SALESROOM

The Consumers' Gas Company

12-14 ADELAIDE ST. WEST PHONE MAIN 1933

SEND FOR OUR REPRESENTATIVE FOR FULL PARTICULARS



Cloisonne GLASS

For Windows, Transoms, Door Panels, Ceiling Lights, Window Blinds, Screens and Partitions, etc., — wherever artistic application of Glass is wanted—Give us an opportunity to show what Cloisonne Glass will do.

Cloisonne Glass Co. of Canada
Office and Factory, 62 Foundry Street South
Berlin - - - - Ontario

Diamond Sash

particularly suited for Gothic and Queen Ann style windows. It is impossible to successfully manufacture these sash without the proper machinery, but we have it. Every light is uniform, the joints are perfect and all the lines are absolutely straight where they should be and uniformly curved in the curved parts.

M. Brennen & Sons Mfg. Co., Ltd.
HAMILTON, ONTARIO

50 Different Angles
TO SOLVE
50 Different Problems

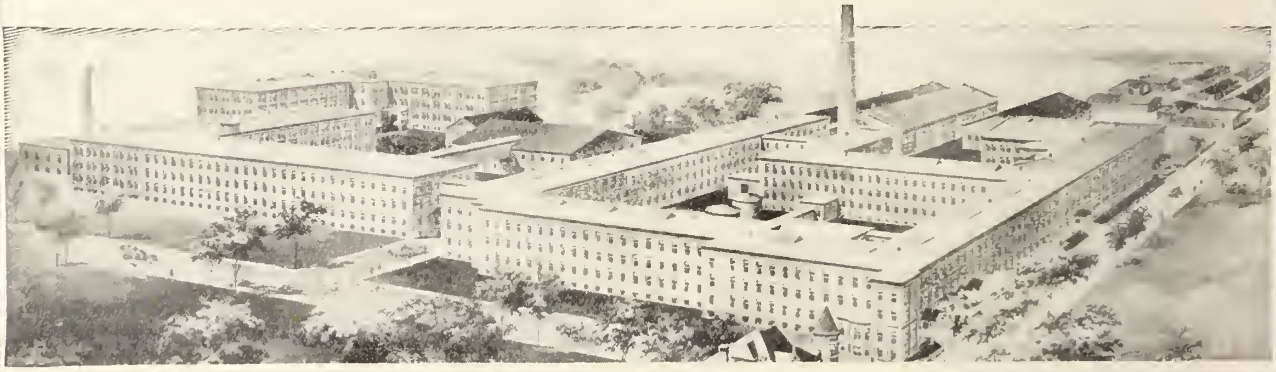
With one, or a combination of these angles LUXFER solves every problem of daylight that is capable of solution.

If your client has a warehouse or store requiring more daylight to show goods in their proper color and quality; bring your problem to us.

Thats what LUXFER-PRISMS are for

Luxfer Prism Company,
Limited,
100 King Street West - - Toronto

Barrett Specification Roofs



Warner Bros. Co., Corset M'f'rs., Bridgeport, Conn., Day & Zimmerman, Engineers, Philadelphia, Pa.

The Most Economical Roof

FOR half a century architects have known that slag and gravel roofs would *often* show marvelous durability.

The Barrett Specification defines the method by which these roofs may be built so that they will *always* show such durability.

It provides for the best materials manufactured, and prescribes the most approved methods of application.

A Barrett Specification Roof will cost less than any other permanent roof, will last upwards of twenty years and will need no painting or coating or care. Such roofs are fire-retardant and take the base rate of insurance.

That is why they are invariably used on large manufacturing plants where the roof areas are great and where, therefore, the unit costs are carefully studied.

Booklet giving The Barrett Specification in full mailed free on request. Address nearest office.

Special Note

We advise incorporating in plans the full wording of The Barrett Specification, in order to avoid any misunderstanding.

If any abbreviated form is desired however the following is suggested: ROOFING—Shall be a Barrett Specification Roof laid as directed in printed Specification, revised August 15, 1911, using the materials specified, and subject to the inspection requirement.

The Paterson Manufacturing Co., Limited

Montreal Toronto Winnipeg Vancouver, St. John, N.B. Halifax, N.S.

ANNOUNCEMENT

Imperial Wire & Cable Company Limited

beg to announce that they have acquired
the business and undertakings of

The Wire and Cable Company, Montreal

The new company will continue to operate in Montreal without change in management and solicits a continuance of your patronage.

John Whitehead & Co.

LIMITED

Albert Works: PRESTON, ENGLAND

Makers of

Reliable

Efficient

Tile and Pipe Machinery, and

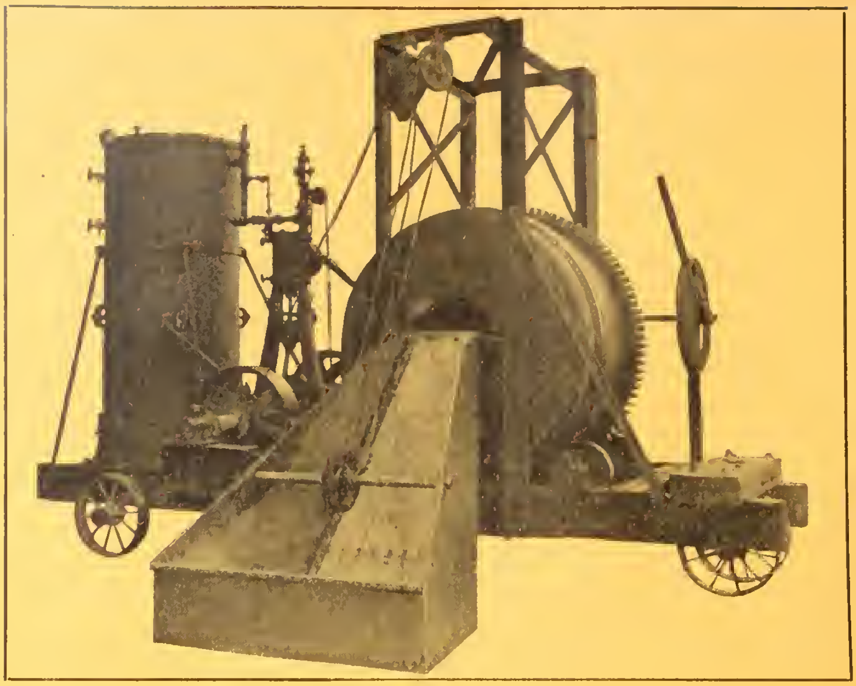
CLAY WORKING PLANT

for all classes of Clays and Shales.

INQUIRIES SOLICITED. CATALOGUES POST FREE.

Established over 75 years. TELEGRAMS: Brictile, Preston

Representatives in Canada:—Messrs. Chambers & Simpson, Engineers, Toronto



WHY should you buy a RANSOME?

When buying a Concrete Mixer

Its not the first cost

But the ultimate cost that counts

You can undoubtedly find many concrete mixers whose first cost is less than the Ransome—but is their ultimate cost less? That's the point.

You cannot afford to buy a machine that is not always reliable, is not satisfactory in operation, is inefficient.

Our Ransome Mixer is the most reliable, efficient and durable mixer on the market. Simple in construction—repair bills are practically nil.

Considering quality and real value in Concrete Mixers—there is no cheaper machine on the market. All sizes in stock.

F. H. Hopkins & Co.

MONTREAL

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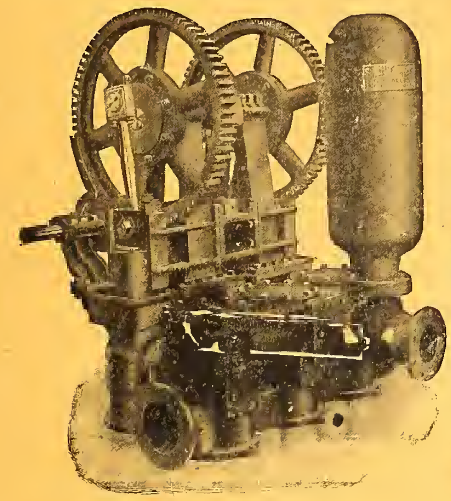
Vol. 26 Toronto, January 10, 1912 No. 2

ESTABLISHED 1886

Contract Record and Engineering Review



We Manufacture Steam and Power Pumps, Condensers Travelling Cranes, Etc.

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HAMILTON, ONTARIO

"MADE IN CANADA"

Bent Glass

Made in all Kinds of Glass on Short Notice

Large Bent Plate Glass for Shop Fronts a Specialty

The Toronto Plate Glass Importing Company, Limited
(HILL & RUTHERFORD, Managing Directors)
Head Office and Works: 91 to 133 Don Roadway
TORONTO

SERVICE

Continuous economical service is what RAND machinery means to purchasers

ROCK DRILLS

PLUG DRILLERS

Canadian RAND Co. Limited
Commercial Union Bldg., MONTREAL, CAN.

Continuous and Machine Banded Wood Stave

WATER PIPE

RESERVOIR TANKS

for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

Pacific Coast Pipe Co., Limited
P. O. Box 563 Vancouver, B. C.
Office and Factory, Granville St., near High Bridge
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Full Particulars and Estimates Furnished

Alphabetical Index of Advertisers, Page 16

Classified Directory to Advertisements, Page 6

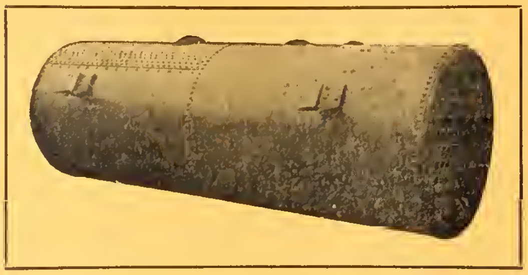
Horizontal Tubular Boilers

Built for any Working Pressure Desired

WE CARRY IN STOCK A COMPLETE RANGE OF SIZES

Also Vertical and Locomotive Types.

Price on Application



Write our Nearest Sales Office.

Ask for Catalog

The Jenckes Machine Co., Limited

General Offices: Sherbrooke, Que.

Works: Sherbrooke, Que. St. Catharines, Ont.

Sales Offices:—Sherbrooke, St. Catharines, Montreal, Cobalt, So. Porcupine, Vancouver

NOTE THE TONE OF THIS LETTER

"For the two 'AMERICAN' Engines which we have used for six years, we have paid very little for repairs. We have Engines of other makes on which the repair bills have been FOUR TIMES what we spent on the 'AMERICANS.'

We use these two engines for Pile Driving (the hardest work an engine is called upon to do), because we consider them better adapted to this kind of work than any other engine on the market.

The several 'AMERICAN' Derricks we have are the BEST WE HAVE EVER USED, and do not see how any one could make a mistake in buying 'AMERICAN' Derricks or Engines."

LANGHORN & ALLAN, Oneonta, Ky.

THERE IS UNMISTAKABLE ENTHUSIASM AND SINCERITY IN THIS LETTER FROM CONTRACTORS WHO RANK HIGH IN THEIR PROFESSION

May we send you prices and information on "American" Machinery?

AMERICAN HOIST AND DERRICK CO.

ST. PAUL, U. S. A.

AUTHORIZED AGENTS—

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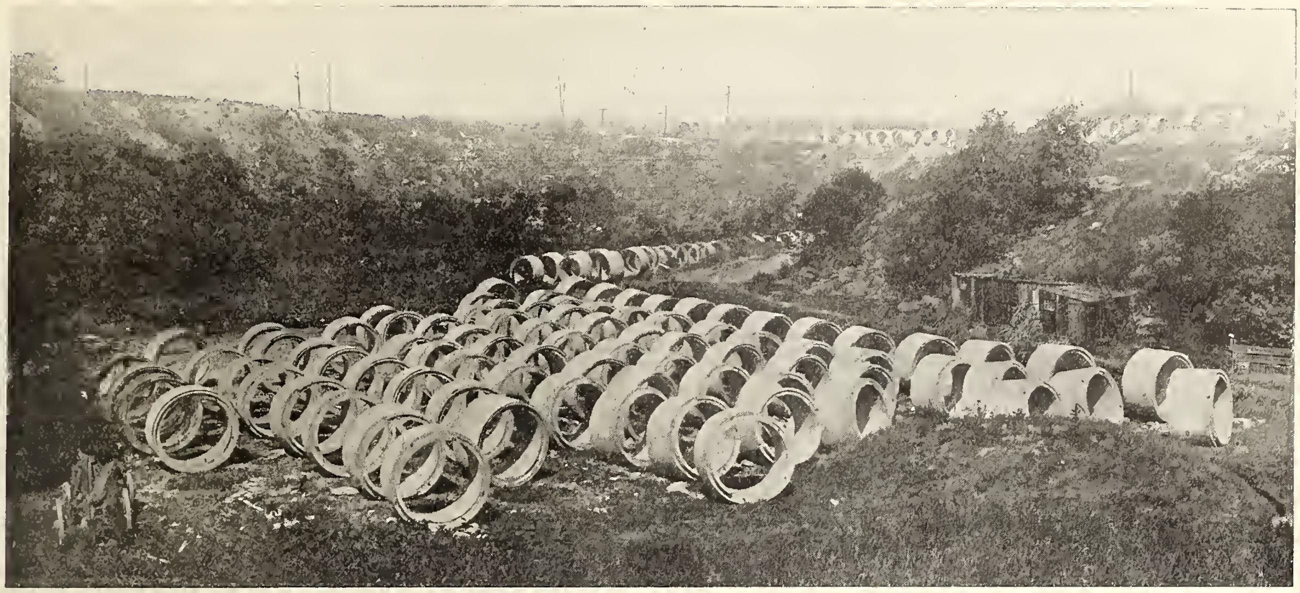

REINFORCED CONCRETE SEWER PIPE. VIEWED FROM C. P. R. TRACK, HAMILTON

If It Passes Our Tests, It Will Meet Your Needs

There is no longer any question about the suitability of concrete for the making of sewer pipes, drains or any work that has to withstand the corrosive effects of acids or the damages inflicted by frost and water.

Reinforced concrete, **properly made,** has been successful in the most rigid tests and is now the recognized material for all important work.

Properly made concrete, means, not only thoroughly mixed and the right proportions of cement, aggregate and sand—it also means that the cement used, be of the highest standard of purity.

The pipes shown here were made in Hamilton, Ont., by the REINFORCED CONCRETE PIPE CO. of JACKSON, MICH. They have made pipes for some of the most important work done, both in the United States and Canada and they now use "Canada" Cement exclusively.

THE REINFORCED CONCRETE PIPE CO., report that although they have, on one piece of work, used cement from no less than five of our mills, they could see no difference in the quality of the cement or in the work produced. That is what the "Canada" Brand stands for:—absolute purity and absolute uniformity.

Canada Cement Co., Limited

MONTREAL - TORONTO - WINNIPEG - CALGARY

The Enormous Capacities

# of the

Symons Disc Crushers

have never been equalled

They can produce from 40 Tons of ¼ inch to 1,000 Tons of 2½ inch per 10-hour day. They are in a class by themselves and will well repay your investigation. Manganese equipped, strong, durable and economical.

Catalogue and Full Particulars on request

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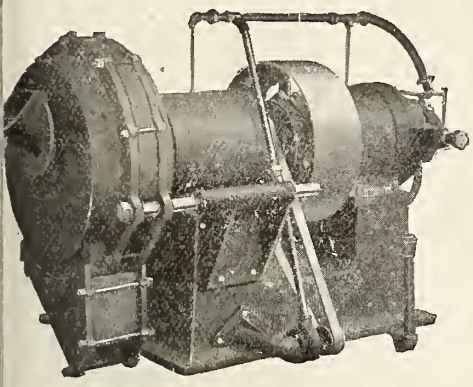
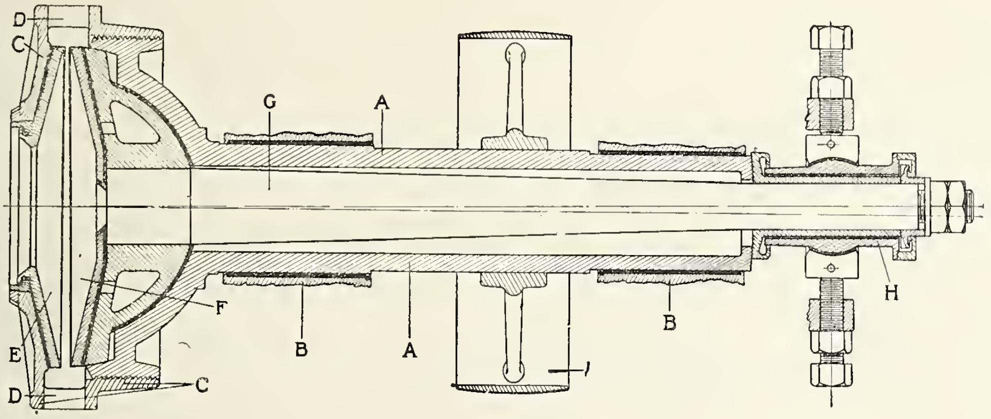
Cobalt, opp. Right of Way Mine.

MUSSENS



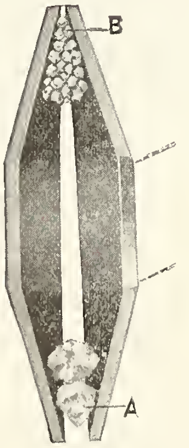
The Symons Disc Crusher



SECTIONAL VIEW

The Manganese Discs

which do the work



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Vancouver, 365 Water Street

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Albert Mfg. Co.
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Pumps and Pumping Machinery
Abenaque Machine Works
American Well Works
Bates & Edmonds
Beatty & Sons, M.
Canadian Boving Co.
Canada Foundry Co.
Cook, A. D.
Escher Wyss & Co.
Hopkins & Co., F. H.
Inglis Co., John

(Continued on page 12)

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¶ The above view is an illustration of one of the many important buildings in which this product is used.

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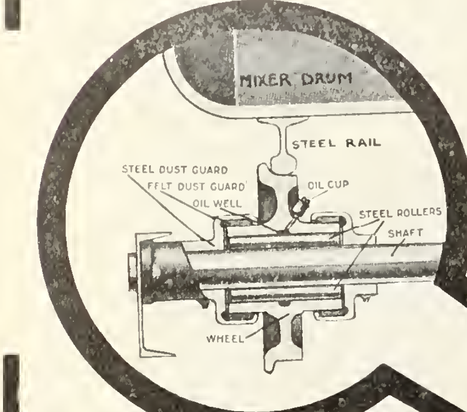

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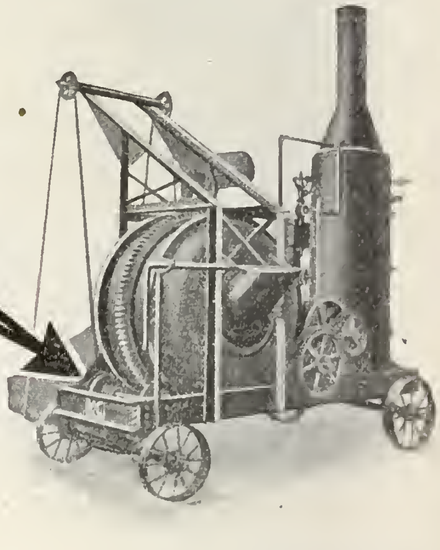

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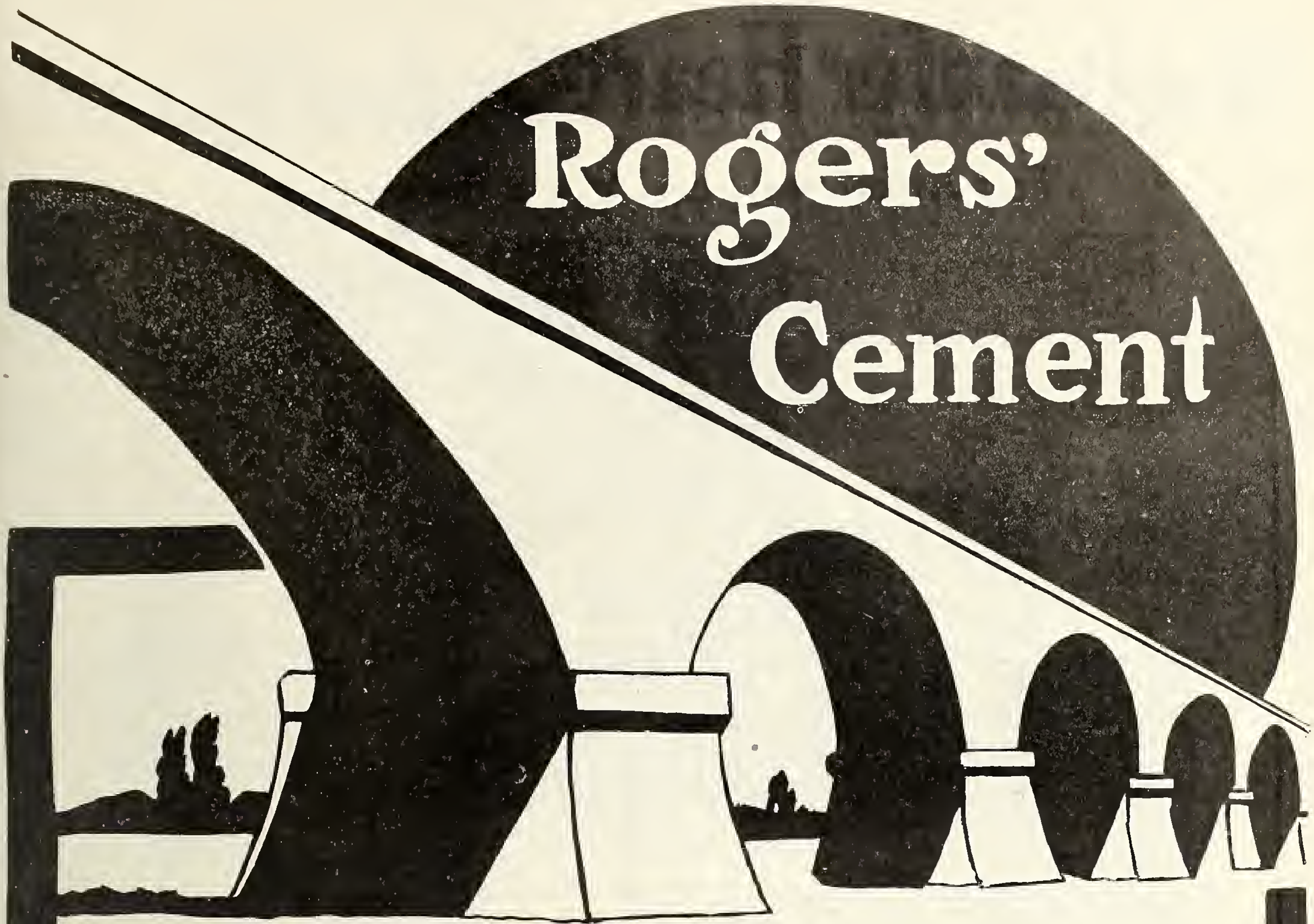

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Capacity 50 yards per 10 hours

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The London Automatic Machines will save you money.
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CLASSIFIED INDEX TO ADVERTISEMENTS—Continued

Pumps and Pumping Machinery
(Continued from page 6)
McDougall Caledonian Iron Wks
Mussens Limited
Ontario Wind Eng. & Pump Co.
Smart-Turner Machine Co.
Waterous Engine Works Co.

Quarry Machinery
Johnston & Chapman
George Anderson & Co.

Railway Supplies
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Hopkins & Co., F. H.
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Ambursen Hydraulic Cons. Co.
Canada Wire & Iron Goods Co.
Factory Products
Ford Iron Co.
Greening Wire Co., B.
Leach Contracting Co.
Page Wire Fence Co.
Steel Co. of Canada
Steel & Radiation
Turner, C. A. P.

Revolving Stone Screens
Greening Wire Co., B.
Johnson & Chapman Company

Road Machinery
Erie Machine Co.
Ford Iron Co.
Hamilton Machinery Co.
Morrison & Co., T. A.
Mussens Limited
Western Wheeled Scraper Co.
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Roofing Materials
Canadian Supply Company
Galt Art Metal Co.
Metallic Roofing Co.
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Noble, Clarence W.
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Sand and Gravel
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Sand & Supplies
Smyth & Ryan
York Sand and Gravel Co.

Screens
Greening Wire Mfg. Co., B.
Johnson & Chapman Company

Sewer Pipe
Britnell & Co.
Canada Iron Corporation
Dominion Sewer Pipe Co.
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Shovels (Steam)
Browning Engineering Co.
Beatty & Sons, M.
Canada Foundry Co.
Ford Iron Co.
Hopkins & Co., F. H.
Montreal Locomotive Works
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Willis Shaw Mach. Co.

Smoke Stacks
Des Moines Bridge Co.

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Sturtevant Co., B. F.

Steel Bars
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Britnell & Co.
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Structural Iron and Steel
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Reid & Brown
Sarnia Bridge Co.
Steel & Radiation

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Rouleau, Joseph N.

Tanks and Stand Pipes
Berg Machinery Co.
Des Moines Bridge Co.
Inglis, John
Jenckes Machine Co.
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McDougall Caledonion Iron Wks
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Hunt & Co., Robt. W.

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Escher Wyss & Co.

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Canadian Boving Co.
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Canada Wire & Iron Goods Co.
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Greening Wire Co., B.
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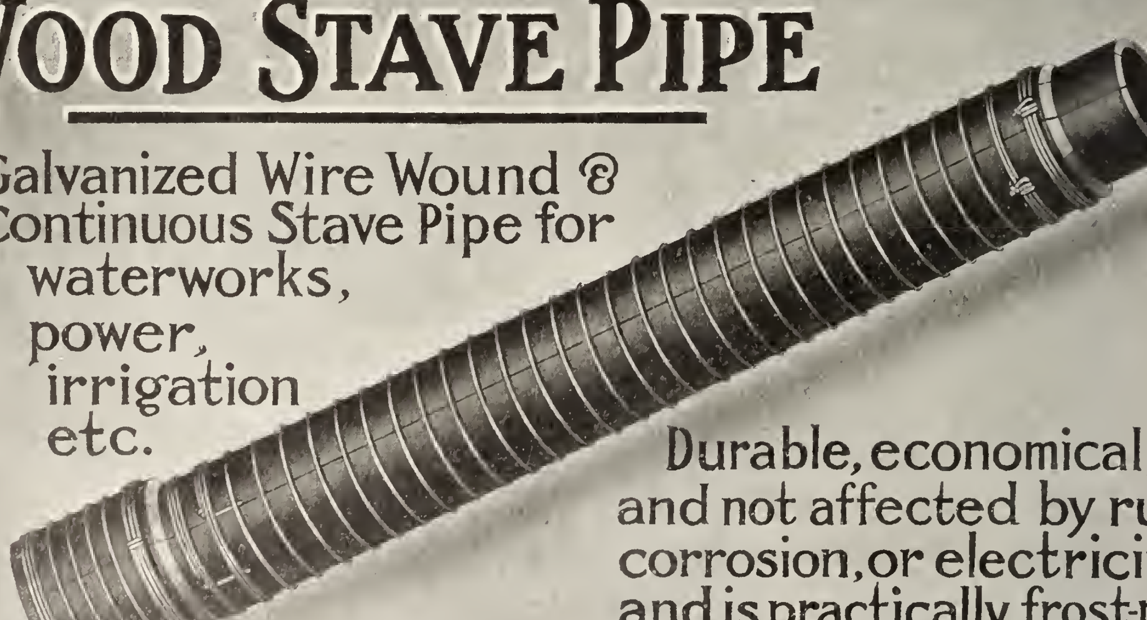

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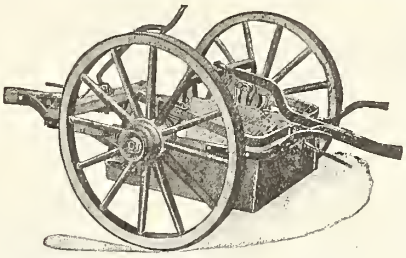

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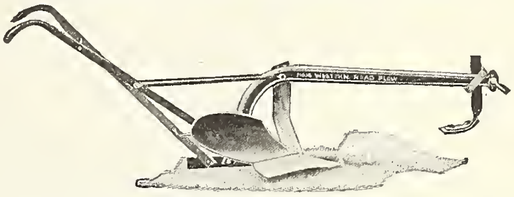

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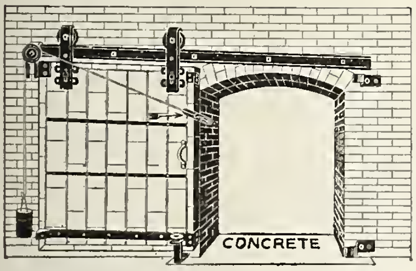

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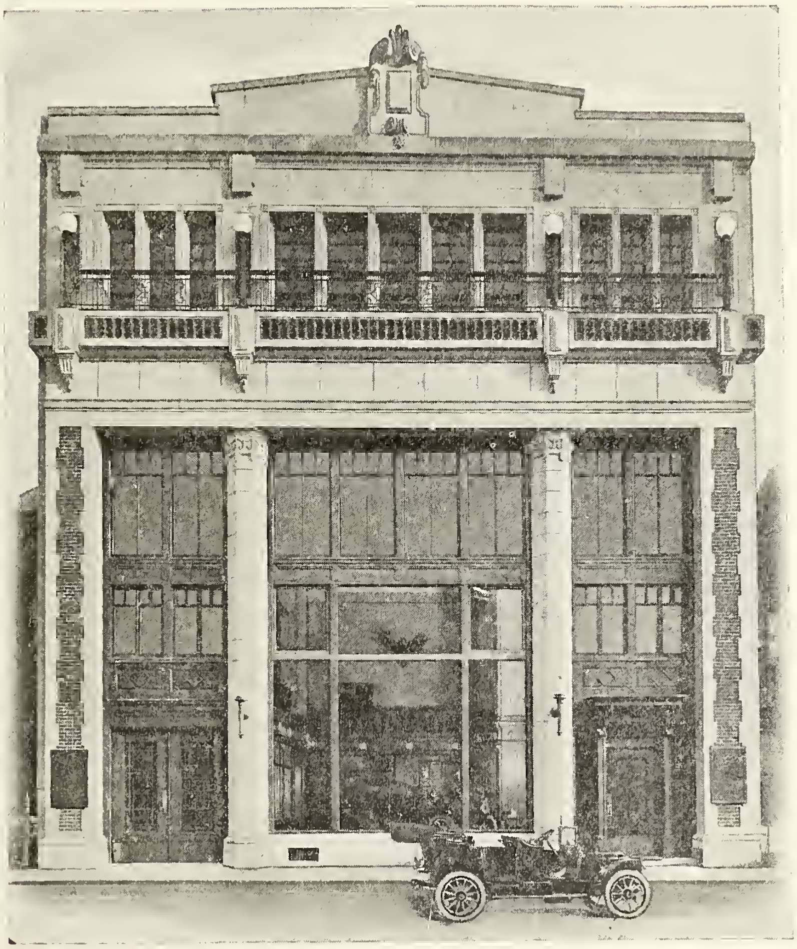

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ALPHABETICAL LIST OF ADVERTISERS

Abenaque Machine Works ... 76
Acme Equipment & Engineering Co. ... 70
Ainsworth & Sons, Wm. ... 27
Albert Manufacturing Co. ... 77
Alsen's American Portland Cement Wks. ... 78
Ambursen Hydraulic Construction Co. of Canada, Ltd. ...
American Enameled Brick & Tile Co. ... 84
American Hoist & Derrick Co. ... 2
American Water Softener Co. ...
American Spiral Pipe Works ... 79
American Well Works ...
Anderson & Co., 1905 Ltd. George ... 22
Andresen, H. P. ... 35

Bain & Ross ... 92
Bates & Edmonds Motor Co. ... 94
Batts Limite. ... 23
Beatty & Sons Limited, M. ... 79
Beckmann Co., L. ...
Bell Filtration Co. of Canada, Ltd. ... 31
Bennett, Robert ... 80
Berg Manufacturing Co. ... 83
Blystone Manufacturing Company ...
Bowman & Connor ... 92
Bremner Limited, Alex. ... 91
Brennen & Sons Mfg. Co., Ltd., M. ...
Britnell & Co., Ltd. ... 86
Brodie & Company, James ...
Brown Hoisting Machinery Co. ... 85
Browning Engineering Company ... 88
Buffalo Meter Co. ... 25
Business Systems Limited ... 75
Bryan Manufacturing Company ... 82

Canada Cement Co., Ltd. ... 3
Canara Fodndry Co., Ltd. ... 20-69-97
Canada Iron Corporation Limited ... 91
Canada Steel Co. ... 80
Canada Wire & Cable Co. ... 94
Canada Wire & Iron Goods Co. ... 80
Canadian Boving Company ... 30
Canadian Bridge Co., Ltd. ... 88
Canadian Fairbanks-Morse Co., Ltd. ... 22
Canadian Kellogg Co. ...
Canadian Office and School Furniture Company, Limited ...
Canadian Norcross Bros. Co. ... 18
Canadian Pipe Co., Ltd. ... 90
Canadian Rand Co., Ltd. ... 1
Canadian Supply Company ... 68
Carey Mfg. Co., Philip ...
Cement Era Pubsishing Co. ... 72
Ceresit Waterproofing Company ... 99
Chipman & Power ... 92
Christie Henderson & Co. ... 86
Cleveland Bridge & Engineering Co., Ltd. ... 88
Cloisonne Glass Co. of Canada ...
Cook, A. D. ...
Commercial, The ... 87
Conduits Company, Limited ... 91
Consolidated Glass Company ...
Consolidated Optical Co., Ltd. ...
Consolidated Stone Co. ...
Consumers' Gas Company ...
Contractors' Supply Co., Ltd. ... 86
Crushed Stone Limited ... 75
Corinthian Stone Co. ... 24

Dahlstrom Metallic Door Co. ...
Dennis Wire & Iron Works Co., Ltd. ... 90
Des Moines Bridge & Iron Co. ... 79
Dickson Bridge Works Co., Ltd. ...
Doolittle & Wilcox Limited ... 91
Dominion Bridge Co., Limited ... 88
Dominion Creosoting Company ...
Dominion Marble Co., Ltd. ... 21
Dominion Sewer Pipe Co., Ltd. ... 21
Dominion Wood Pipe Co., Limited ... 10
Don Valley Brick Works ... 7
Down Draft Furnace Company ... 95

Eadie-Douglas Limited ... 36
East Iron & Machine Co. ... 78
Eastern Pipe & Construction Co., Ltd. ... 95
Eaton & Sons, Ltd., J. R. ... 84
Erie Machine Shops ... 87

Factory Products Limited ... 35
Farmer, John T. ... 92
Federal Engineering & Supplies Limited ... 74
Ferguson, H. S. ... 92
Ford Iron Company, Limited ... 8
Foundation Company ... 93
Fuce, Edward O. ... 92

Galt Art Metal Co., Limited ...
Galt Engineering Co., John ... 92
Gartshore, John J. ... 87
Gartshore-Thompson Pipe & Foundry Co., Ltd. ... 90
General Machinery Co., Ltd. ... 21
Georgian Bay Shook Mills, Ltd. ... 95
Gibb, Alexander ...
Goodyear Tire & Rubber Co. of Canada, Ltd. 33
Greening Wire Co., Ltd., B. ...
Guarantee Company of North America ... 92
Gurley, W. & L. E. ... 82

Hagerville Contracting Co., Ltd. ... 13
Hamilton Machinery Co., Ltd. ... 26
Hamilton Pressed Brick Co. ... 29
Hancock, Jr., H. Syd. ... 92
Harvey, J. ... 87
H. & E. Lifting Jack Co. ... 76
Heinicke Inc., H. R. ... 70
Hepburn, John T. ... 17
Hobbs Manufacturing Co., Ltd. ... 76
Holmes & Sons, Fred ... 80
Hopkins & Company, F. H. ... 100
Hunt & Company, Robert W. ... 92
Hunter Bridge & Boiler Co., Ltd. ... 89

Imperial Wire & Cable Co., Ltd. ... 99
Inglis Company, John ... 67
International Marine Signal Co., Ltd. ... 14

Jamieson Lime Company ... 81
Jenckes Machine Company, Ltd. ... 2
Johnston, A. H. ...
Johnston & Chapman Company ...

Keefer, Allan ... 92
Kennedy, James C. ... 92
Kerr Engine Co., Ltd. ...

Laurentian Granite Co., Ltd. ... 92
Lea, R. S. ... 92
Leach Concrete Company ... 32
Leonard & Sons, E. ... 75
Leslie & Co., Ltd., A. C. ...
London Concrete Machinery Co., Ltd. ... 11
London Gas Power Co., Ltd. ... 71
Luxfer Prism Company ...

Mace, T. Harry ... 92
MacKinnon Holmes & Co., Ltd. ... 27
MacLean Daily Reports ... 81
Marsh & Henthorn Limited ... 71
McCoy Company, Henry J. ... 32
McDougall Caledonian Iron Wks. Co., John 69
McIlwraith, James A. ... 92
McMillan & Son, W. N. ... 76
McNally & Co., William ... 89
Meadows, George B. ... 35
Metal Shingle & Siding Co. ... 73
Metallic Roofing Co., Ltd. ... 71
Metropolitan Paving Bricks Co. ... 80
Miller & Co., George M. ...
Milton Pressed Brick Company ...
Mitchell, Chas. H. & Percival H. ... 92
Mitchell Company, Ltd., Robert ... 72
Missisquoi Marble Co., Ltd. ... 84
Montreal Locomotive Works, Ltd. ... 75
Morrison & Co., T. A. ... 92
Munderloh & Co., Ltd. ... 13

Mussens Limited ... 4
Myers, Oakley ... 75

National Bridge Co., of Canada, Ltd. ... 89
National Iron Works Ltd. ... 91
Neptune Meter Co. ... 25
Noble, Clarence W. ... 78
North Company, Ebenezer ...
Northwestern Terra Cotta Company ... 85

Ontario Asphalt Block Co., Limited ... 78
Ontario Lime Association Limited ... 77
Ontario Sewer Pipe Co., Ltd. ... 20
Ontario Wind Engine & Pump Co., Ltd. ... 75
Ormsby, Ltd., A. E. ... 13
Owen Bucket Co. ... 76

Pacific Coast Pipe Co., Ltd. ... 1
Page Wire Fence Co., Ltd. ...
Patterson Manufacturing Co. ... 98
Pedlar People Limited ... 34
Phoenix Bridge & Iron Works, Limited ... 89
Port Credit Brick Co., Ltd. ... 90
Power & Son ...
"Prime White" Road Oil Co. ...
Pyle-National Electric Headlight Co. ... 19

Queenstown Quarry Co., Ltd. ... 91

Reid & Brown ... 92
Rhodes, Curry Company, Limited ... 71
"R. I. W." Damp Resisting Paint Co. ... 19
Rogers Limited, Alfred ... 9
Rogers Supply Company ... 27
Roman Stone Co., Limited ... 15
Rouleau, Jos. N. ... 92

Sackville Freestone Co., Ltd. ... 14
Sand & Supplies, Ltd ... 89
Sarnia Bridge Co., Ltd. ... 89
Shawmut Vitrified Paving Brick Works ... 70
Smart-Turner Machine Co., Ltd. ... 1
Smith Limited, Thos. & Wm. ... 96
Smyth & Ryan ... 86
Standard Drain Pipe Co., Ltd. ... 21
Standard Foundry & Machine Co. ... 32
Standard Ideal Co., Ltd. ... 36
Steel Company of Canada ... 30
Steel & Radiation, Ltd. ... 28
Steward, A. P. ... 74
Sturtevant, B. F. ... 80

Taylor, Hogle & Davis ...
Taylor, J. & J. ...
Tide Water Iron Works ... 77
Thew Automatic Shovel Co., The ... 74
Thompson & Co., B. & S. H. ... 85
Toronto Furnace & Crematory Co. ...
Toronto Plate Glass Importing Co., Ltd. . 1-85
Troy Wagon Works Co. ... 84
Turner, C. A. P. ...

Union Water Meter Co. ... 25
Universal Crusher Co. ... 79

Vining Manufacturing Co. ...
Vulcan Iron Works ... 84

Wadsworth Howland & Co., Inc. ... 79
Waterous Engine Works Co., Ltd. ... 77
Watson Wagon Company ... 70
Weeks, Arthur L. ... 92
Wells & Gray, Ltd. ... 94
Western Canada Contractor ... 86
Western Wheeled Scraper Co. ... 13
Wettlaufer Bros. ... 10
Whitehead & Co., Ltd., John ...
Wilson Bros., Ltd. ...
Woods Limited ... 25
Wyss & Co., Escher ... 73

York Sand & Gravel Co. ... 86

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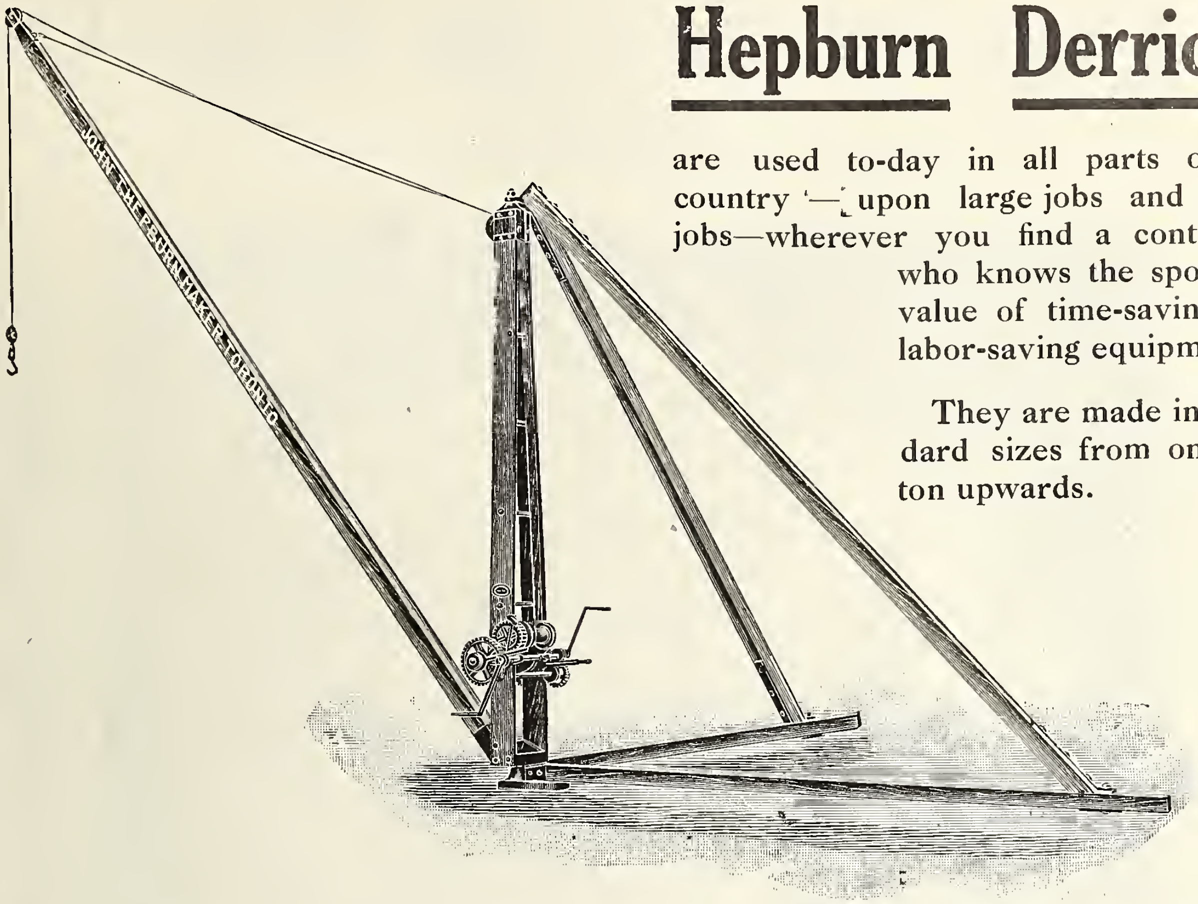
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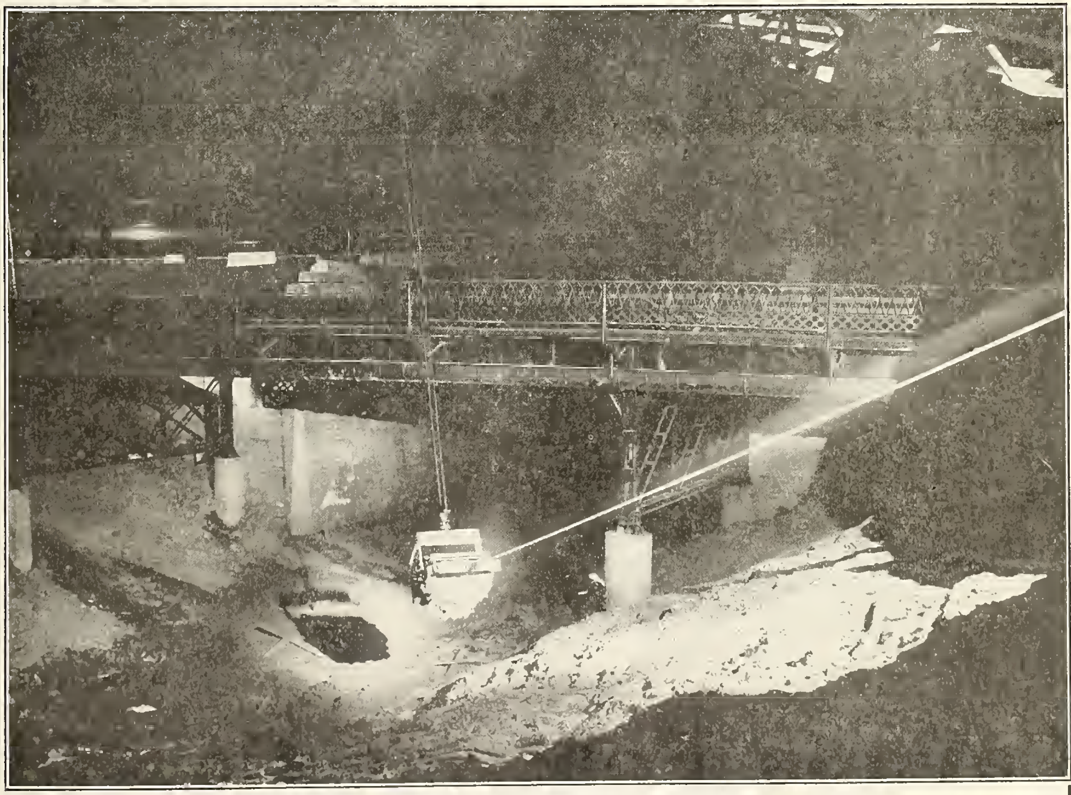

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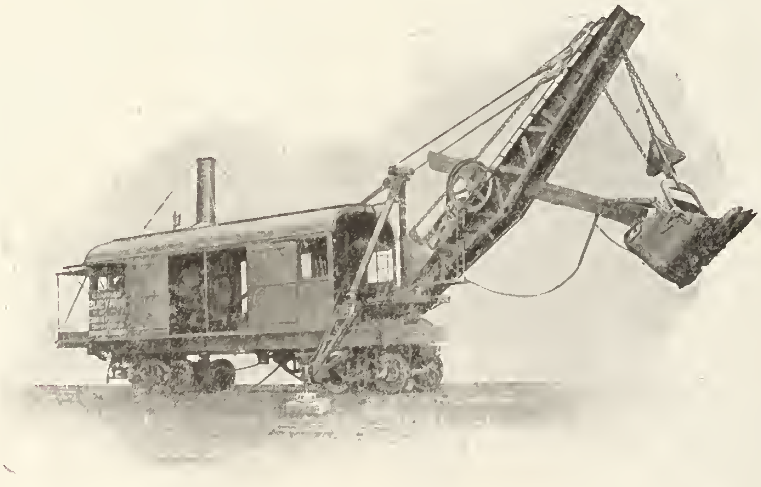

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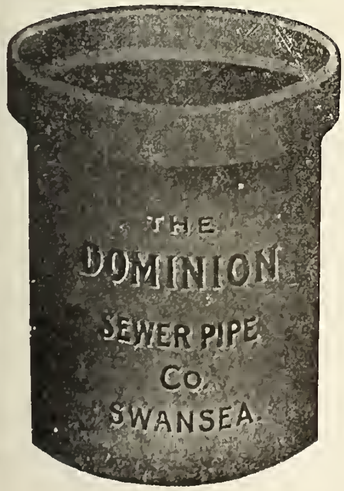

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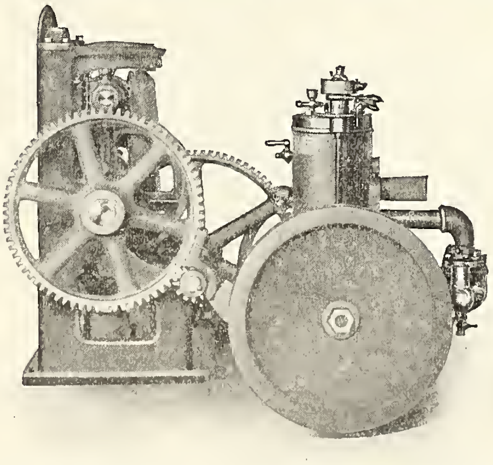

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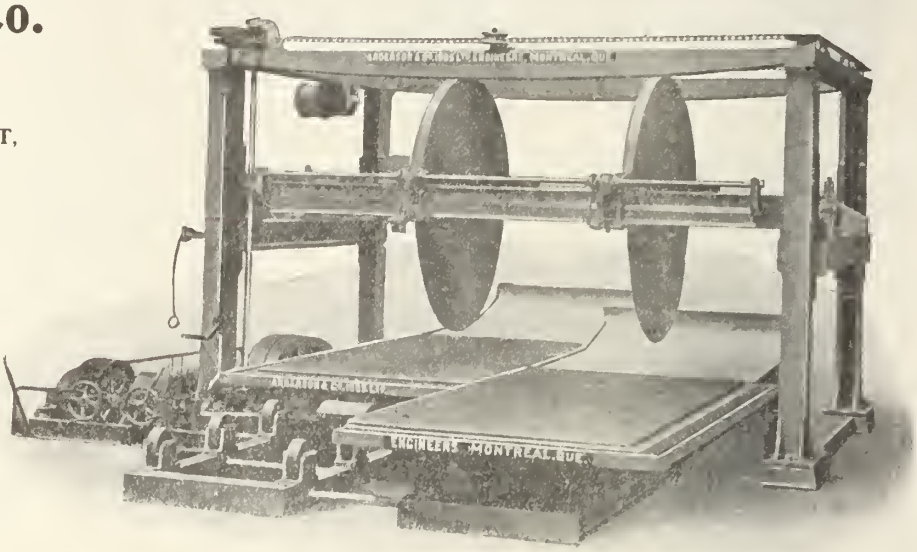

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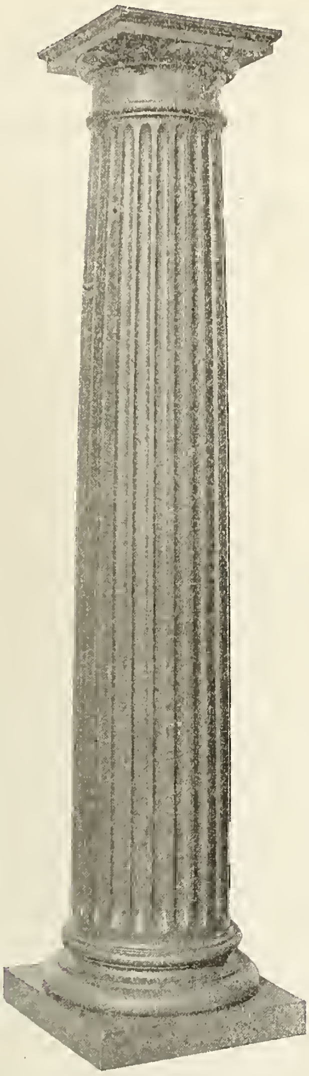

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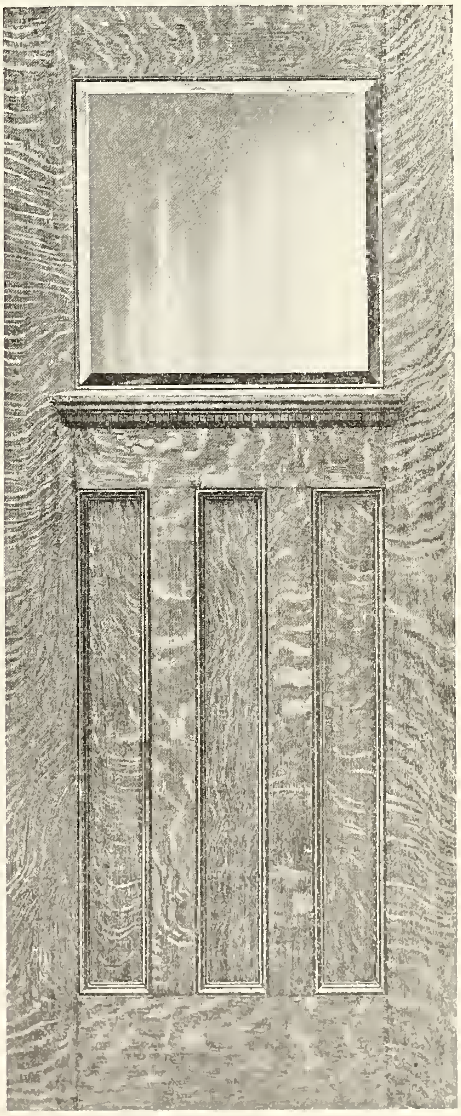

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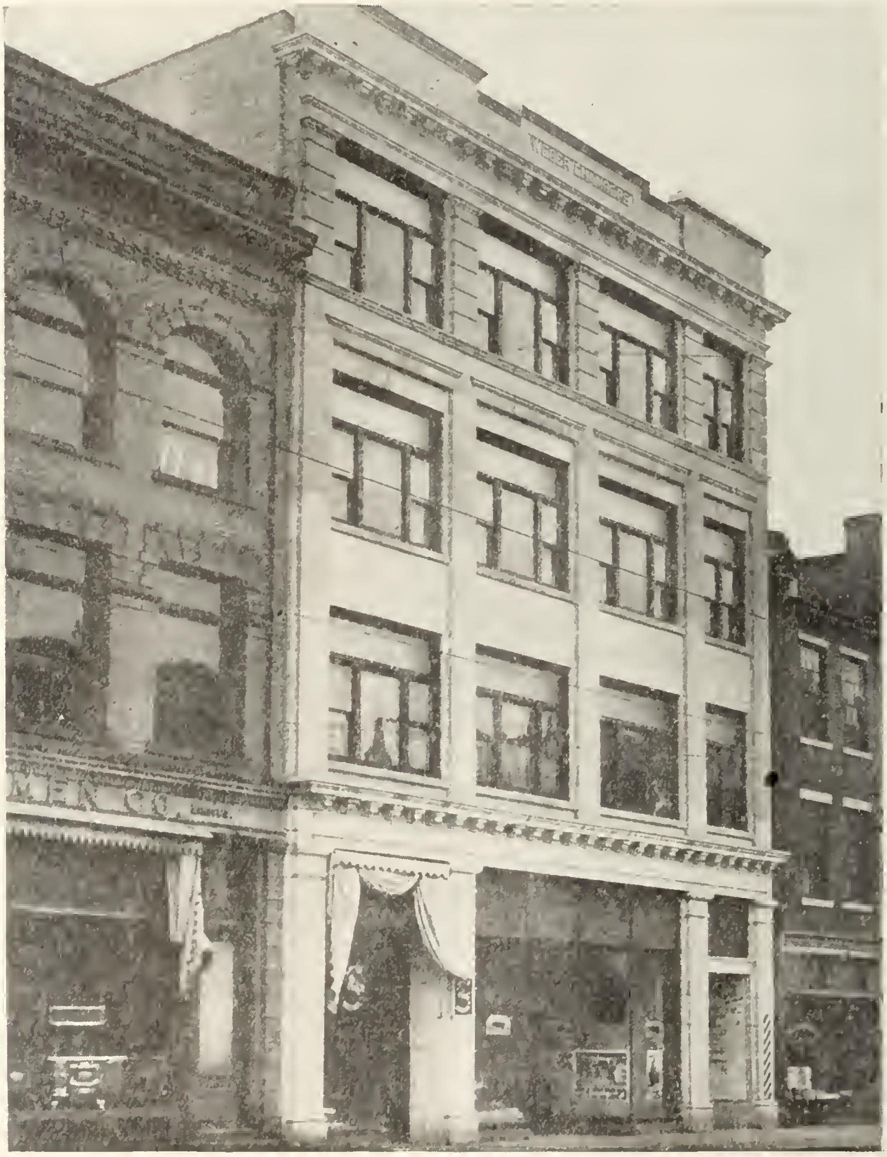

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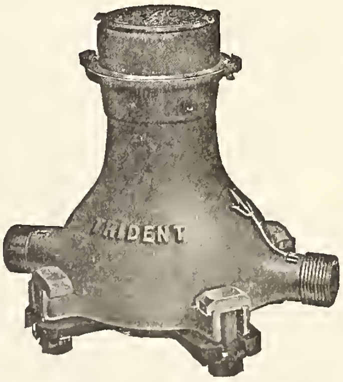

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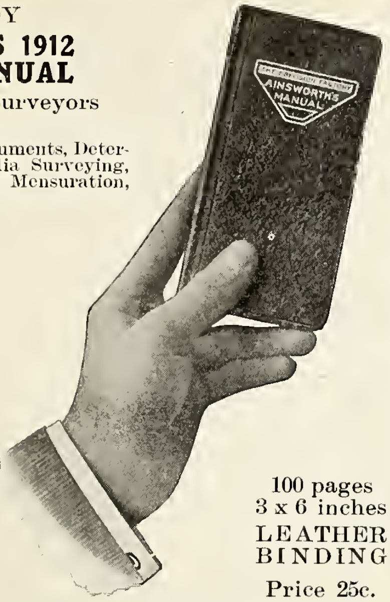

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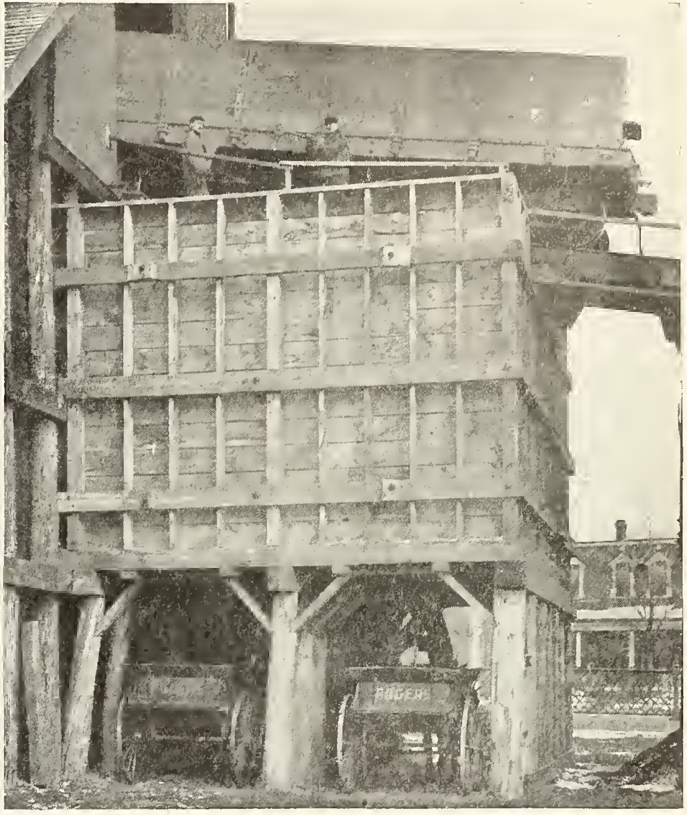

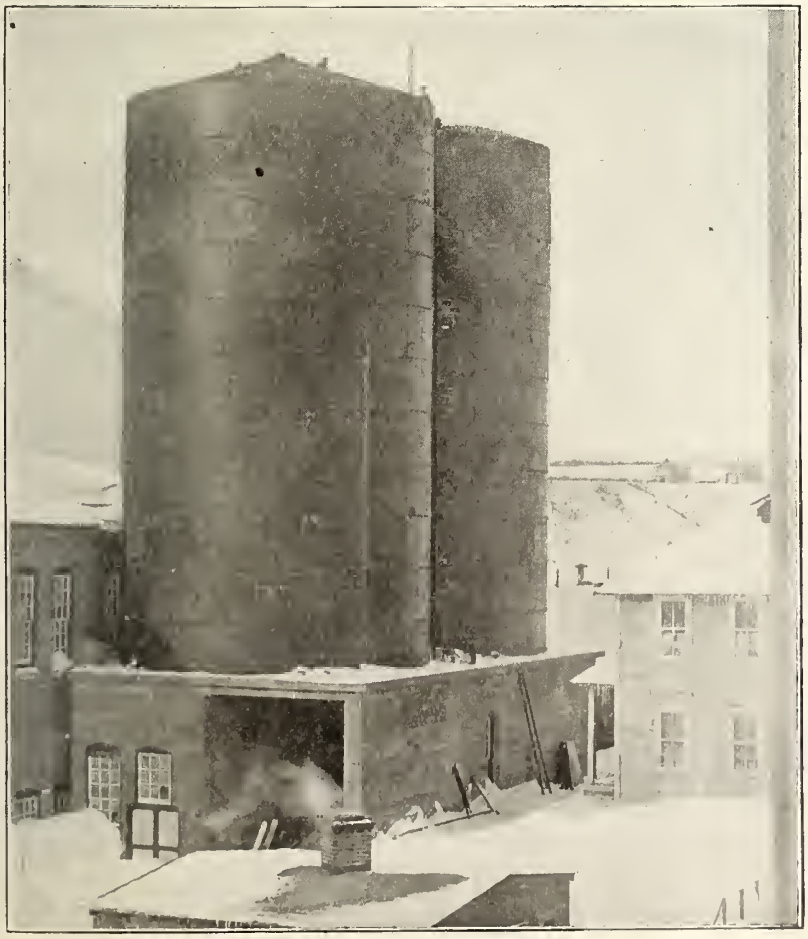

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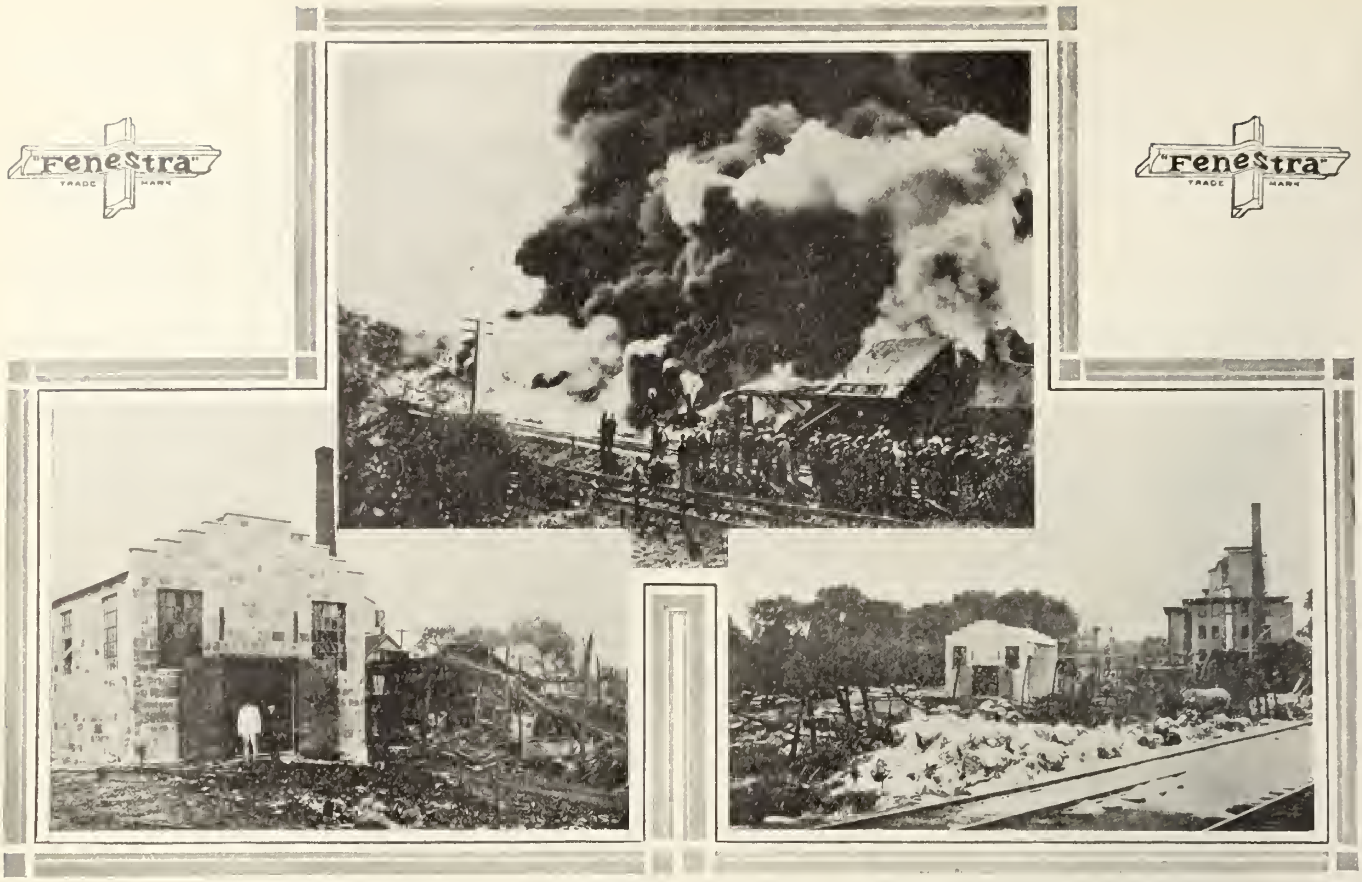

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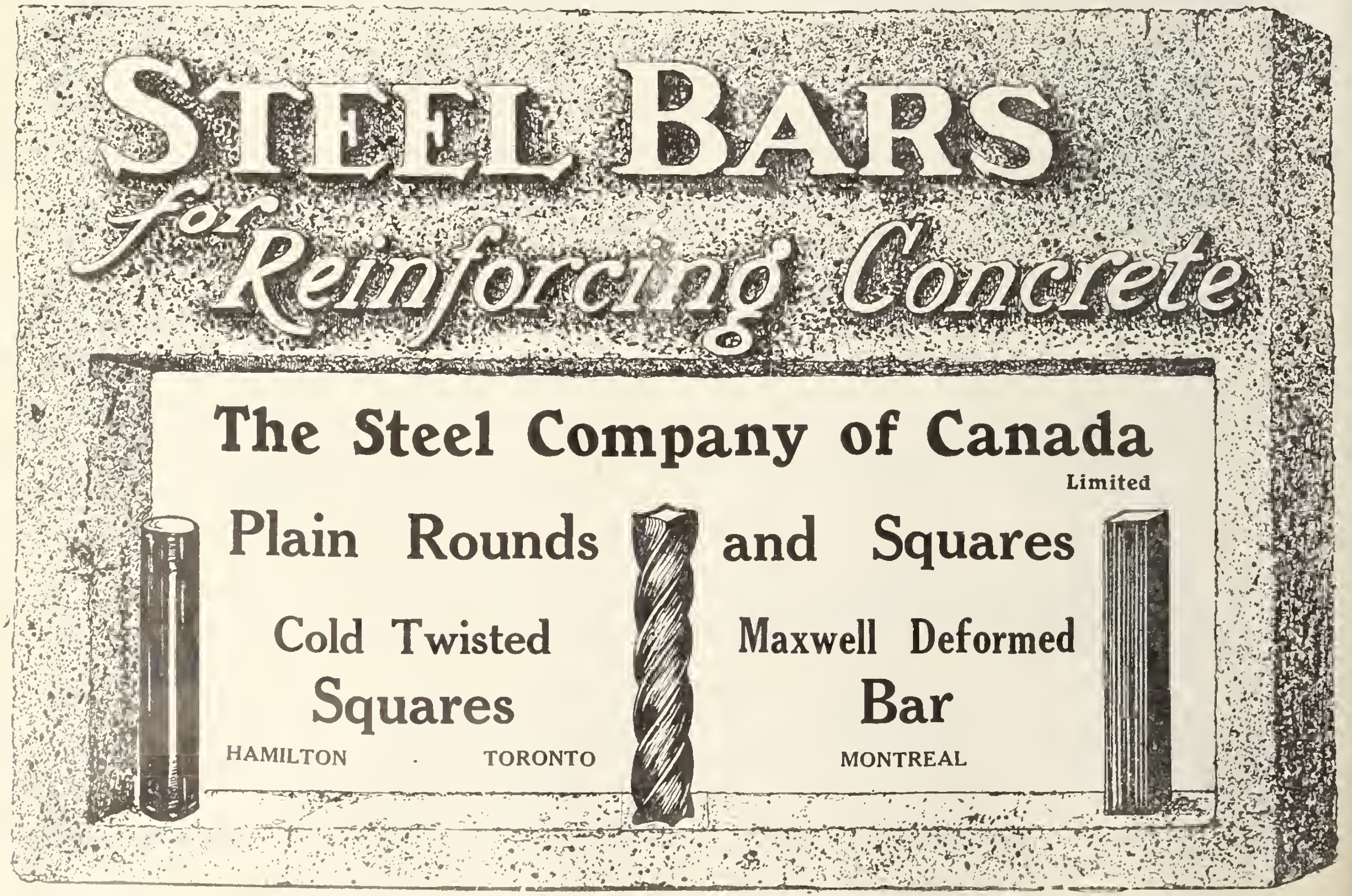

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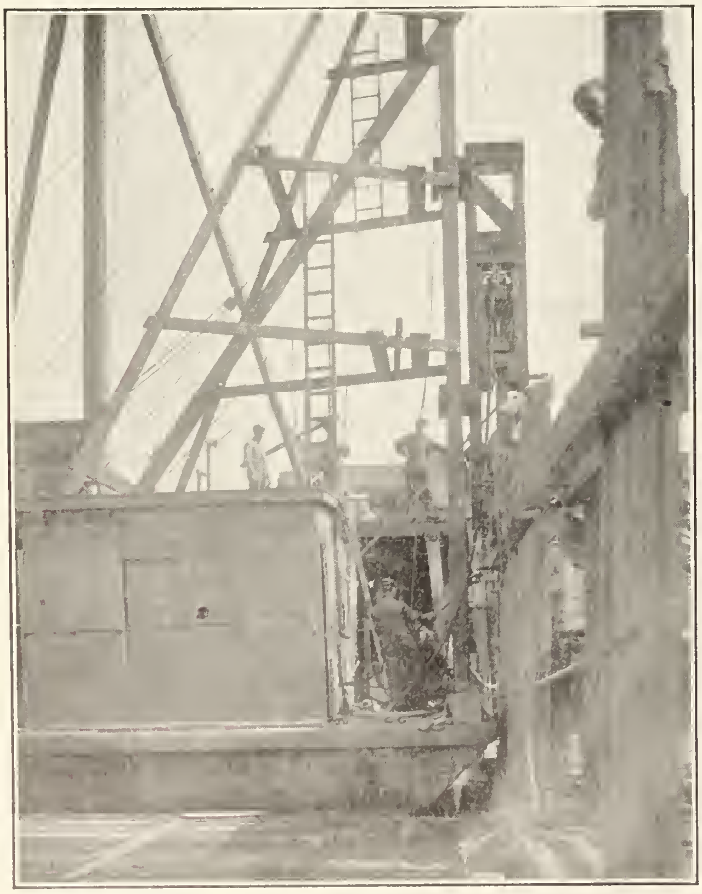

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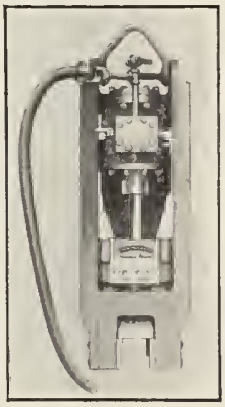

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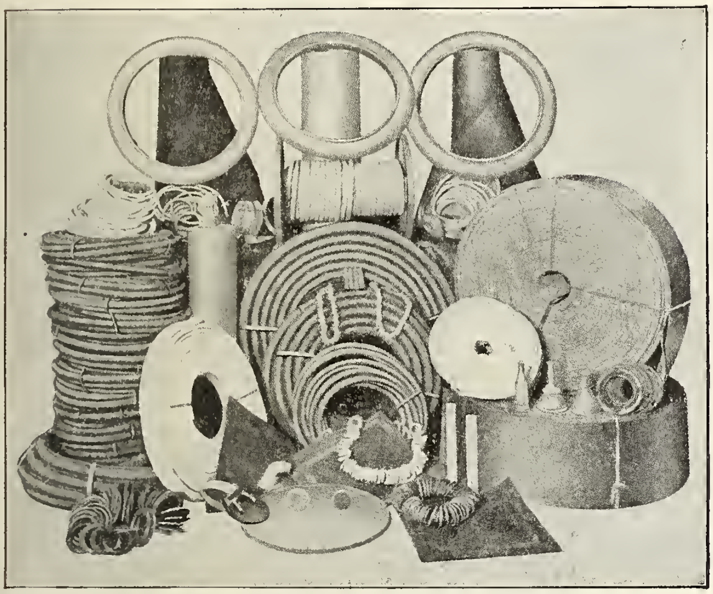

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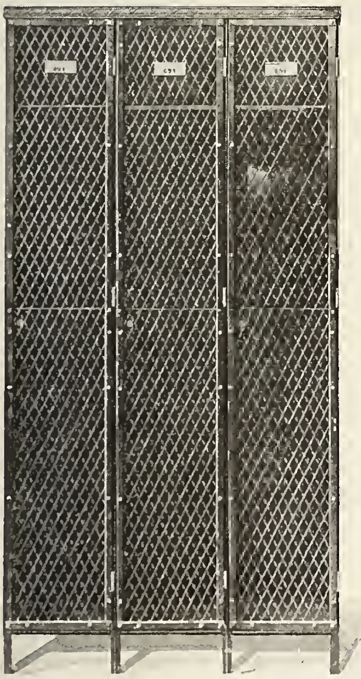

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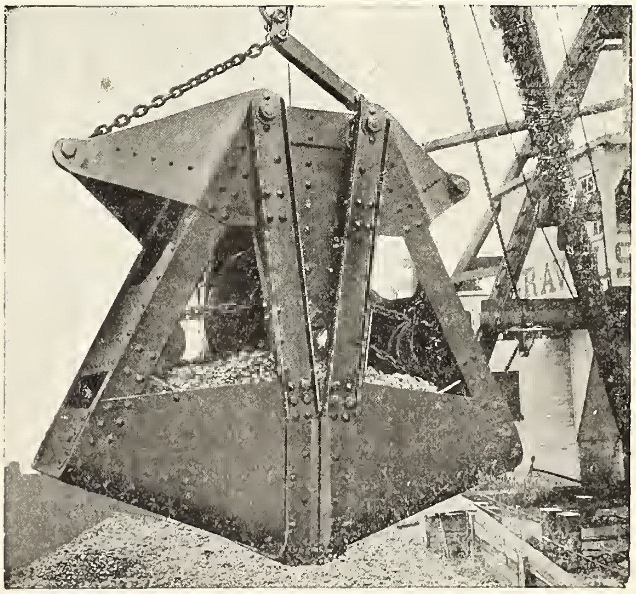

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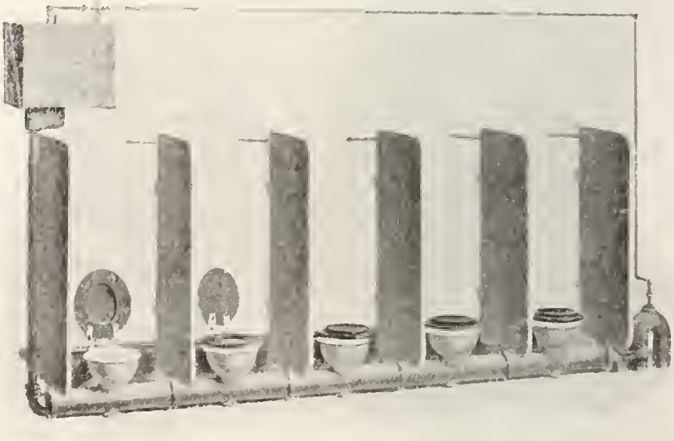

Plate F. 517

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Contract Record
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Vol. 26 January 10, 1912 No. 2

Handicaps to Small Contractors

Some engineers who write specifications and supervise work on small contracts fail to realize that the contractor is frequently obliged to bid for and carry on his work under conditions entirely too severe for the character and size of such contracts. It is not unusual for an engineer to abstract requirements from the specifications for large contracts when preparing specifications for small jobs, says the Engineering Record, and in so doing the tendency is to embody in these specifications conditions which add little or nothing to the quality of workmanship and materials or to the safeguarding of the "party of the first part."

The amount of the bond or certified check is often greatly in excess of the risk involved, and as it is not usual to allow the contractor interest on the money so tied up, he is limited in the scope of his operations, for he must make the best possible use of the small capital at his command. The percentages retained on monthly estimates are often as high as 15 or 20 per cent., and as the engineer's estimates are likely to be well on the safe side any way, the retained percentage is, in reality, often 25 to 30 per cent. of the total value of work done. Furthermore, it is not customary in the monthly estimates to allow for materials delivered, and even when some such allowance is made, it usually covers but a small portion of the materials so delivered. The final payment is sometimes retained for an excessive length of time after the completion of the work, and the contractor, during this period, is required to make repairs which are rather maintenance charges than the result of faulty materials or workmanship.

All of these conditions result in an increased cost of the work as a whole, if the contractor is sufficiently experienced to take them into consideration when making up his bid, and on first thought he is not injured thereby. But when such unnecessarily rigid conditions make it difficult for an honest and capable contractor to finance his work, when his retained payments prevent him from discounting his bills and limit his resources so that he cannot bid on other work, he is working under conditions which are not only unfair, but which injure his standing as a business man.

The engineer supervising such contracts sometimes appears to take the position that for his duty to be done he must require the contractor to live up not only to a strict interpretation of each clause in the contract, but also to what he himself reads in between the lines. He should realize that his full duty as an engineer requires him to act in the spirit of fairness and helpfulness to the contractor who, after all, naturally wishes to do his work in a first-class manner for the sake of his reputation if for no other reason. More equitable consideration in preparing and supervising small contracts will not only make the working conditions of the contractor easier, but will result in satisfactory work at a lower cost than where it is reasonable to expect fussiness over every detail and nagging over every unimportant delay.

The New Year, broadly speaking, is the least happy of dates for labor because it begins the season when unemployment is greatest, says a contemporary. Most wage statistics are based upon the average number of employed hands during the year and the total amount of the payrolls; but this is far from giving an accurate account of the state of wage-earners. A recent census bulletin, to illustrate, covers industries that employed an average of six million six hundred thousand hands in 1909; but in November these industries employed a little over seven million hands, while in January they employed only six million two hundred thousand, in round numbers. Eight hundred thousand hands that were employed in the fall were idle in midwinter or employed in some field outside the census survey. This rule obtains in a great number of big industries. In working lumber and timber, for example, seven hundred and thirty-nine thousand hands were engaged in November; only six hundred and forty-nine thousand in January. In foundry and machine shops the number of hands dropped from nearly six hundred thousand in December to less than five hundred thousand in January. There is a tremendous variation from a year of good times to a year of hard times. Taking all wage labor, probably a steady job is its best boon; and whatever tends to make finally for industrial instability is its worst foe.

Clay-Workers to Chicago

Chicago will be the Mecca of the clay working interests next March, when the National Brick Manufacturers' Association, the American Ceramic Society, the National Paving Brick Manufacturers' Association, the Building Brick Association of America, the Association of Manufacturers of Clay Working Machinery, the Western Drain Tile Bureau, the Illinois Clay Manufacturers' Association and the Wisconsin Clay Manufacturers' Association will hold their conventions. Invitations have been sent out to mayors and engineers of all the cities in the United States to attend a municipal congress which is to be held at the same time.

Proposed Standard Brick

Anent the proposal to institute a standard brick, to which editorial reference was made in the December 13, 1910, issue of The Contract Record and Engineering Review, we have received the following letters. The subject is one concerning which we shall be glad to have further discussion.

"Entirely in Agreement"

Department of Mines,
Ottawa, Jan. 5, 1912.

Editor Contract Record and Engineering Review:

I am entirely in agreement with your editorial on the Standardization of Brick published in your Brick & Clay Products Number of Dec. 13th last. There is no question as to the advantages of having standard sizes, and, as you say, the longer the delay in standardizing the more difficult it will be to carry it into effect. The clay industry is bound to expand very rapidly in Canada, and of course the larger it becomes the greater will be the confusion and the more difficult it will be to introduce standard sizes.

Yours truly,
R. W. Brock.
(Director Geological Survey)

Difficult to Arouse Active Interest

Milton, Ont., Dec. 28th, 1911.

Editor, Contract Record and Engineering Review:—

This is a question in which it seems impossible to get the brick makers to take any active interest. There is no doubt that there should be a standard set for bricks which all the brick makers could follow. The size of pressed brick in the United States is 8⅜ x 4⅛ x 2⅜ inches. The size of common brick is 8⅜ x 4⅛ x 2¼ inches.

While these are the sizes approved of by the National Brick Manufacturers' Association of America, it seems impossible to get all the different parties interested to fall in line. The matter has been thrashed out by the Canadian Manufacturers' Association with about the same results.

We do not see that anything more can be done than to bring the matter to the attention of the brick makers. If an agreement were entered into for the standardization of brick it would not be long before the other fellow would be making a little thicker brick and advertising them as cheaper than others.

Yours truly,
Milton Pressed Brick Company, Limited,
J. S. McCannell, Managing Director.

"Cannot Get Together Too Quickly"

Clayburn, B. C., Dec. 26th, 1911.

Editor Contract Record and Engineering Review :—

As manufacturers we cannot get together too quickly to formulate a standard sized brick which would be acceptable to all from coast to coast. Standardization would save architects a great deal of trouble in laying out their work and would make for greater strength in the walls, except, of course, in cases where bricks manufactured by one firm are used exclusively. It would also be a great boon to contractors figuring on work at a distance and would eliminate a great deal of the speculation and uncertainty which has prevailed hitherto. I will certainly do all in my power to advocate a uniform size of brick throughout the country. I do not imagine that this would be as hard to bring about as the article in your special number of December 13th, 1910, would lead one to believe. I think you will find that the manufacturers who are now almost conforming to one size are in the majority, and that those who make an unusually large or small brick are hopelessly in the minority. In my opinion, all that is required is some able champion to inaugurate a campaign and stimulate the interest of the trade. I have no doubt that this will be done.

Wishing the movement every success, I am,

Yours very truly,
J. B. MILLAR,
(Manager Clayburn Co., Ltd.)

"Would Like to See It Accomplished"

Lennoxville, Que., January 2, 1912.

Editor, Contract Record and Engineering Review:—

The standardization of brick is a difficult proposition to undertake, but we would like to see it accomplished and will give it such support as it is in our power to give.

Yours very truly,
E. A. DUKE.
(Secretary Eastern Townships Brick & Mfg. Co.)

Find Sizes Satisfactory

Sydney, N.S., December 29, 1911.

Editor, Contract Record and Engineering Review:—

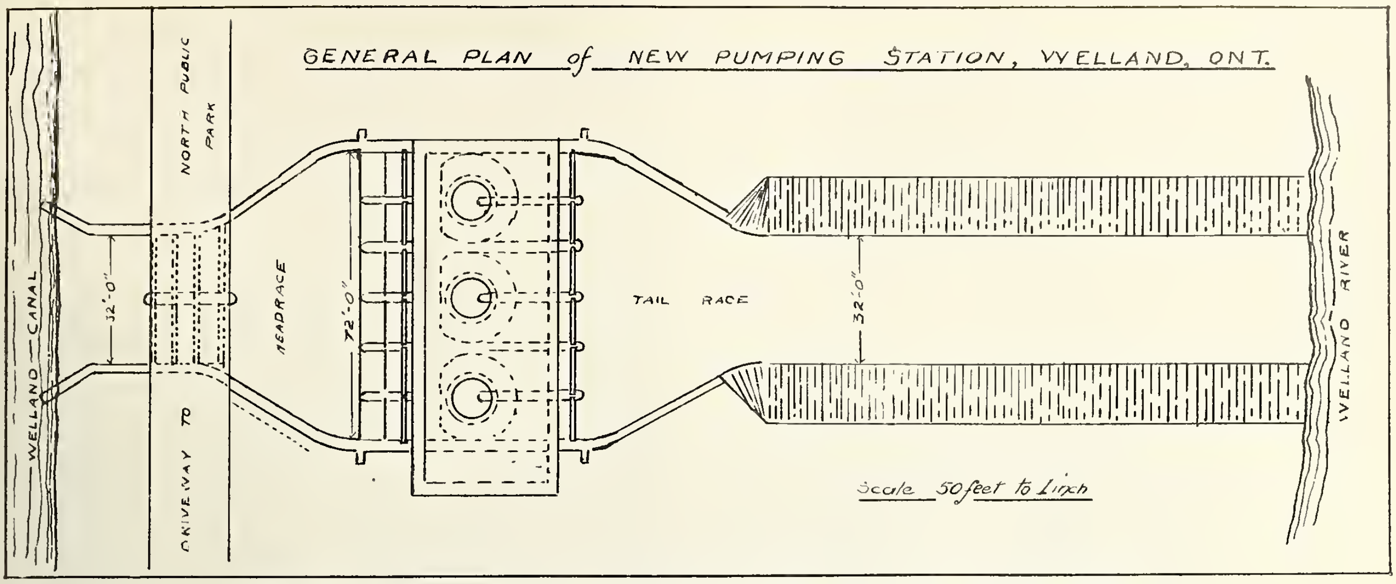
In reply to your enquiry we have to say that the dimensions of our bricks are 8 3/16 in. x 4 x 2 3/16 in. We find this satisfactory.

Yours truly,
Sydney Pressey Brick Co., Limited.
W. C. Burchell, Managing Director.

Grease in garbage at Toronto was determined by a test made in January, 1911, at the works of Messrs. W. Harris & Company, under the direction of Messrs. Hering & Gregory, consulting engineers, of New York City. The object of the experiment was to ascertain by means of the reduction process the amount of grease contained in samples of Toronto garbage. Ten loads of garbage and rubbish, having a total weight of 11,075 lbs. were delivered at the works. This material was sorted over and the rubbish removed from it, leaving a net weight of 8,823 lbs. The garbage was then subjected to the reduction process and it was found from the results and analyses that the total amount of grease was about 4.1 per cent. of the weight of garbage. It is impracticable to recover all the grease, but it is stated that by the use of the naphtha process the total amount of grease which could have been recovered would have been about 4 per cent. of the weight of the garbage.

In all the records that have been made and that are being made in Canada, none is more creditable nor does any contain a better indication of healthy progress than the building record of the City of Toronto. Last year the permits reached the great sum of $24,374,538, an increase of nearly $3,500,000 over the 1910 total. The number of new buildings erected in Toronto last year was 9,869 compared with 8,499 in 1910.

At Trinity Bay, Newfoundland, there are valuable slate deposits good for roofing and other purposes. They are 600 to 800 feet in width and extend for miles.



1.—Showing Position of Pumping Station to Welland Canal and Welland River.

New Pumping Station at Welland, Ont.

Specially Contributed to the Contract Record and Engineering Review

The Town of Welland was very fortunate in obtaining concessions from the Government, which granted water from the Welland Canal not only for domestic and industrial use but also for power.

Ten acres of land was procured on what is known as the Island, where the plant is being erected. The Island is formed with the Canal and Welland River. The difference in level between the Canal and River averages ten feet.

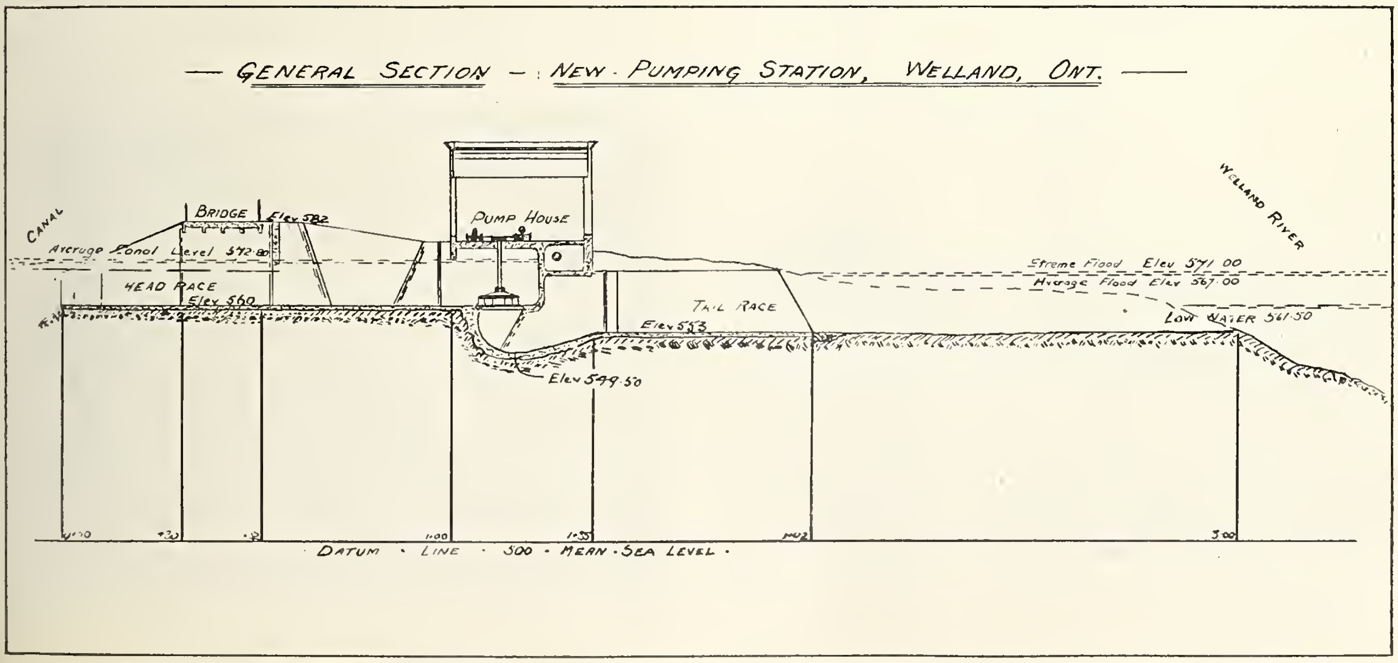
The new works are constructed entirely of reinforced concrete, excepting the pump-house, which is of brick with reinforced concrete roof.

The concrete floors for intake, headrace, and inlets to wheels are set at an elevation of 560 mean sea level. The high water level of canal is 572.50 feet. The concrete floors for wheel outlet and tailrace are 553 feet, while the average flood level of river is 567 feet and the low water level of river 561.50 feet, mean sea level.

The intake at canal has a width of 32 feet, and in front of wheels the headrace has a width of 72 feet. The construction is shown on the accompanying plan. Each of the three wheel inlets is 22 feet in width and is partly divided in two by a pier, carrying the structure above, also having the penstock stop-logs, and the steel racks. The wheel outlets are likewise 22 feet wide and have also piers dividing the outlets carrying the upper structure and provided with stop-logs. The tailrace at outlets is 72 feet wide, and fifty feet from the pump-house is reduced to thirty-two feet in width. Heavy stop-log gates are also provided at the intake bridge.

The foundations are on hard clay, all soft spots being excavated out and holes filled with concrete. The pump-house foundations, canal intake walls and floors, headrace walls and floors, tailrace walls and floors, and piers, etc., were all constructed of concrete composed of one part cement, three of sand, and five parts stone.

The floors of the pump-house and bridge were composed of 1:2:4, and finished with a one-inch coat of cement mortar composed of one part cement to


— GENERAL SECTION — NEW PUMPING STATION, WELLAND, ONT. —
CANAL
BRIDGE
Elev 582
PUMP HOUSE
Average Canal Level 572.80
HEAD RACE
Elev 560
TAIL RACE
Elev 553
Elev 549.50
WELLAND RIVER
Streme Flood Elev 571.00
Average Flood Elev 567.00
Low Water 561.50
1.00
1.55
3.00
DATUM · LINE · 500 · MEAN · SEA LEVEL ·

2.—Section showing water levels in Canal and River, also general construction of wheel and pumps.

two parts sand. The cement was tested periodically during the progress of the works.

Round steel was used for the reinforcing and varied in diameter from 1 3/8 inches to ¼ inch. The wheel floors were reinforced with 18-in. I-beams, weighing 70 lbs. per foot, and round steel.

The pump-house is built with white Don Valley brick of first quality and faced with same make No. 1 red pressed brick. The sills are of hard limestone neatly finished. The concrete roof slabs are composed of one part cement, two parts sand and four parts gravel, not larger than one-inch diameter, and reinforcel with steel, covered with five-ply, 10-ounce roofing felt.

3.—Showing wheel-pit under construction and first concrete form in place.

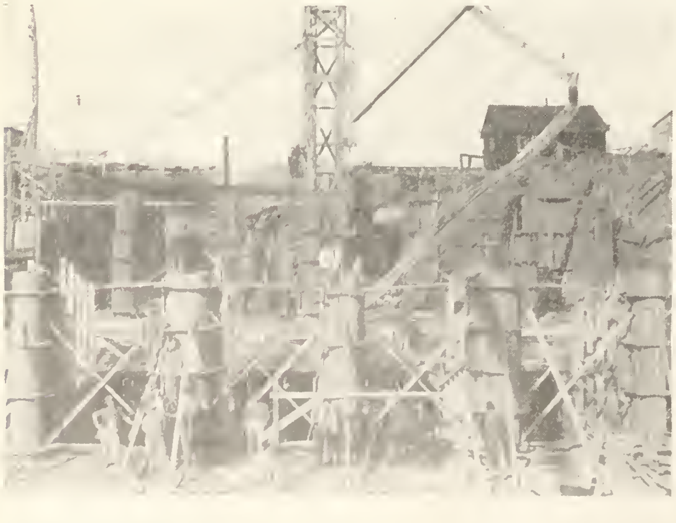
Wheels and Pumps

The water wheel is about ten feet in diameter, and under eight feet head of water, measured from head water surface to tail water surface when the wheel is running, will make twenty-eight revolutions per minute. When operating under these conditions it is guaranteed to have ample capacity to work the pumps continuously when they are discharging three million imperial gallons of water daily against a pressure of 120 lbs. per square inch in the air vessel.

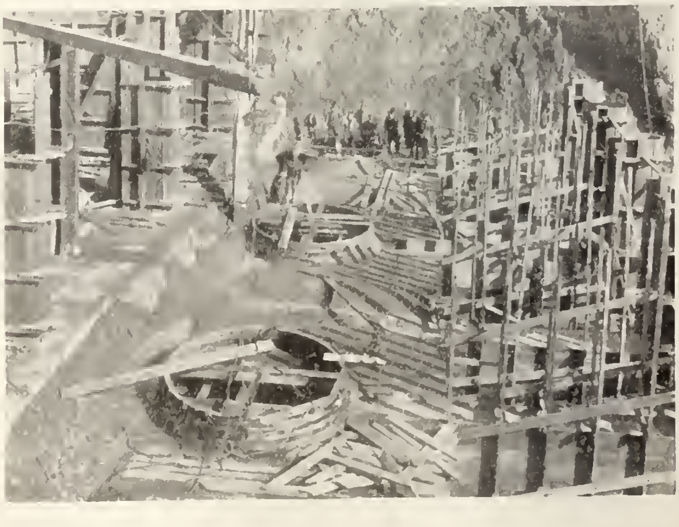
The water wheel runner and shaft are supported entirely by a bearing on top of the water wheel case, thus doing away with the necessity of cross arms and footsteps beneath the runner. The hand-operated water wheel gate moving apparatus will have an indicator showing the percentage of total gate opening, and number of square inches opening of gate.

There are three horizontal, single acting, outside packed, plunger pumps,—the bed plates of which are connected together—each between the pumps. The pump plungers are driven by three connecting rods, direct coupled to one crank on the top of the 8⅝ inches diameter turbine shaft, thus securing the advantages of three throw plunger pumps, without the friction losses of gear and cost of upkeep. There are three suction pipes, one to each pump cylinder with reflux valve and screen to each.

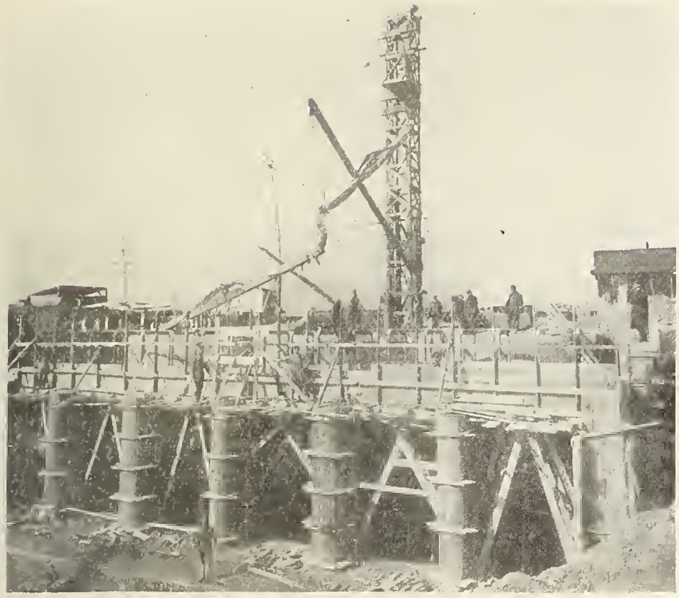
The discharge pipes from the three pumps are connected to one pipe with air vessel at the junction. These pipes have a stop valve between the air vessel



4.—Forms erected for stop-log piers, tail-race. In background can be seen concrete mixer, elevator tower, and concrete shoot.



5.—Ready to receive reinforcing and concrete, turbine wheel floor. Showing opening for wheel outlet and draft tube.



6.—Showing wheel-pit completed and forms being erected for wheel chambers.

and main discharge pipe to the town, with which it is connected. The pumps will be fitted up with glass water gauges, pressure gauges, revolution counter, etc.

The whole is to form one complete pumping unit, with provision for two further units, so arranged as to work separately from, or in conjunction with, each other.

Mr. Wm. Kennedy, Jr., Montreal, is engineer for the works, and the construction is in charge of Mr. D. T. Black, Town Engineer, Welland. The contractor for the concrete work is Mr. W. H. Weller, St. Catharines. The pump-house contract is in the care of Messrs. David Dick & Co., Ltd., Welland, while The Canadian Boving Company, of Toronto, have the contract for the wheel and pumps.

Experimental Filtering by the Quebec Board of Health

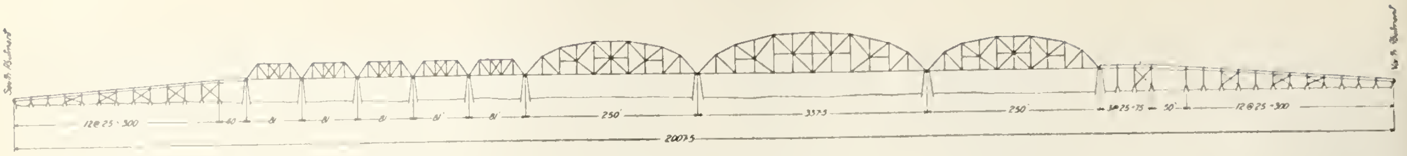
At Ahuntsic, the Quebec Board of Health has installed a non-submerged filter for water testing purposes and is conducting a series of experiments with a view to ascertain whether it is suitable to Canadian conditions. This type of filter owes its origin to Drs. Miquel and Mouchet, of the City Bacteriological Laboratory of Paris, and Mr. Leon Janet, of the Paris Water Department. It differs from the ordinary submerged sand filter in that the sand layers are not kept flooded with water, the unfiltered water being allowed to sprinkle down over the sand, and to percolate through the layers without any interruption in the form of a regulated outlet valve. The sand and gravel bed consists of some four feet of sand, with about two feet of graded gravel at the bottom, the water being distributed from overhead at a predetermined rate through two spray jets for every square foot of filter space. The filter is described as having considerable merit in the case of water highly polluted with organic matter, a vital part of the operation consisting in the beneficial results accruing from the aeration of the water as it is thrown on the filter beds.

The filter installed for test purposes is of about eleven feet in diameter, with a filtering capacity of 4,000 gallons per day. Daily analyses are made of the water immediately before and after it has passed through the filter and the results are being tabulated in such form that the health authorities will be able to give authorative information on the efficiency of the filter under all conditions. The department is at present operating at the rate of two million gallons an acre a day; this will be increased should the results prove satisfactory. At present the filter is working on a fairly highly colored water, and if this color content can be reduced, it will be of great interest, as the high color removal cannot be effected by the slow sand filter.

One reason for the installation is the desire to compare results obtained in Europe with those secured here. It is also desired to determine the cost data in regard to initial capital investment and operating expenses of filtering a million gallons of water. The result will be available for the use of all municipalities seeking information in the matter of installing improvements to water supply systems. Besides the filter above referred to, an ultra violet ray machine is in course of erection, and this method of water purification will also be given thorough tests.

It was proposed to instal the non-submerged filter for the purification of Montreal water, but Messrs. Hering & Fuller, the New York experts, did not favor this type on the ground that at the city's outer intake there is no deficiency of oxygen with respect to the organic matter present, and also because local climatic conditions would lead to complications in the process of aeration to which the matter is submitted. They also made an adverse report on this type of filter as being too radical a departure from current practice and experience on this side of the Atlantic.

A difficult railroad location problem, where 17½ deg. curves and 4 per cent. grades were unavoidable, except at prohibitive cost, was solved on a branch of the Great Western Railway of New South Wales by the adoption of geared locomotives, standard gauge being maintained. The line in question runs north from Sydney and drops from a high spur ridge into the Wolgan Valley. Details of the work of location, which determined the course adopted, are given by Mr. H. Deane in a paper before the Sydney University Engineering Society. It was originally proposed to construct a cable incline from the top of the spur overlooking the valley. The valley is hemmed by sheer faces several hundred feet in height, and there are only occasional breaks where it is possible to get down. If traffic had justified, the descent could have been made with long spiral tunnels, but to bring the cost within practicable limits, the heavy grades and curves were necessary. The line, as located, drops about 1700 ft. in 9 miles through the valley of Penrose Creek, developing distance in a narrow gorge. There are reverse curves, several tunnels and a section near the bottom where the line is on the side of a cliff so steep that construction laborers were lowered on ropes to drill the rock. The question of gauge was involved in the study of the problem, and narrow gauge was rejected because of its limitation of loads on steep grades and because it barred the equipment of the main system. The cost as constructed for geared locomotives was about $19,500 per mile, whereas an estimate for a line with curves of about 7 deg. and grades of 2½ per cent. was given by Mr. Deane as four times that much.



General Diagram of Bridge

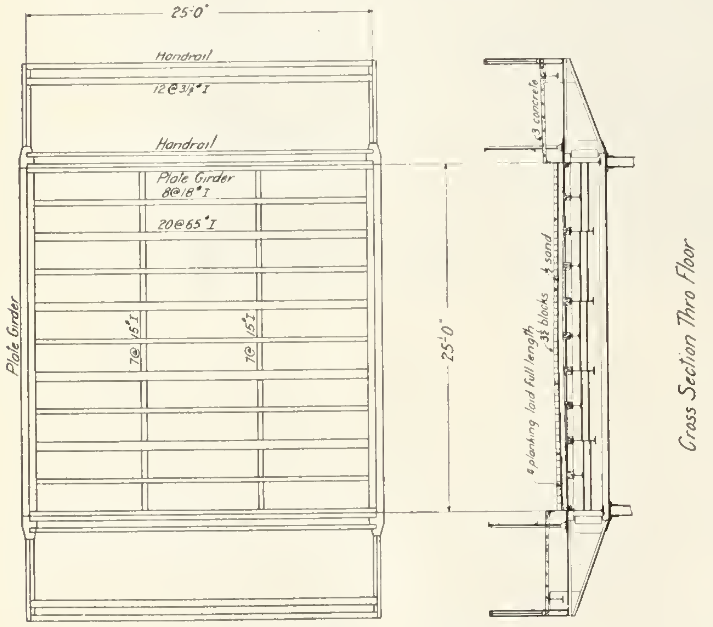
Arlington Street Bridge, Winnipeg, Man.

A Noteworthy Structure containing many Interesting Features of Design and Construction—Detailed Description of Superstructure

Special to the Contract Record and Engineering Review

The Arlington street bridge, a highway bridge over the Canadian Pacific Railway Company's yard at Winnipeg, Man., was designed by Professor Brydone-Jack, of Winnipeg, and built by the Cleveland Bridge & Engineering Company, Limited, of Darlington, England.

The contract was made with the Canadian branch of this company, all shop drawings having been made at the offices in Montreal under the supervision of Mr. W. Chase Thomson, M. Can. Soc. C. E., the company's Canadian manager.



Typical Panel of Floor

The steel, with the exception of the rolled I-beam stringers, was fabricated in England, at the company's shops. The I-beam stringers were supplied by the United States Steel Products Company and punched by the Manitoba Bridge Company.

The structure is 2007.5 feet long from centre to centre of bearings on abutments. A sloping approach at each end, on the south 240 feet long, and on the north 425 feet long, leads to a series of trusses, 5-81 feet, 2-250 feet and 1-337.5 feet centre to centre of piers. (See sketch). It is designed for a twenty-six foot clear roadway, fifteen feet clear headroom, with two lines of car tracks, for electric cars, spaced 11.75 feet centre to centre, and with two six-foot clear sidewalks carried on cantilever brackets outside the trusses.

The loading is as follows:

For the 81-ft. trusses a live load of 1,800 lbs. per lineal foot for each car track and 100 lbs. per square foot on remaining floor surface and sidewalk; for the 250-ft. and 337.5-ft. trusses, a live load of 1,200 lbs. per lineal foot for each car track, and 100 lbs. per square foot on remaining floor surface and sidewalk; for the floor beams, 24 tons concentrated on two axles 10 feet apart for each car track, and 100 lbs. per square foot for remaining floor surface; for the track stringers, 12 tons concentrated on two wheels 10 feet centres; for roadway floor, a concentrated load of three tons on one foot width of floor; for sidewalk stringers and brackets, a uniform load of 100 lbs. per square foot; for sidewalk slab, a uniform load of 200 lbs. per square foot, or a concentrated load of 500 lbs. on 36 square inches.

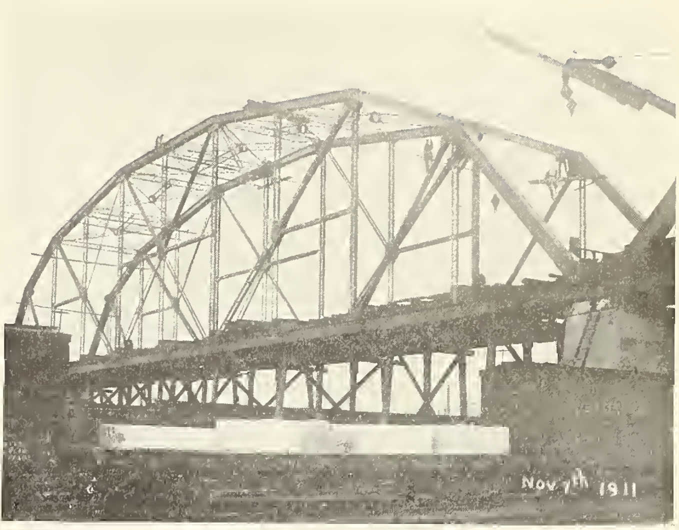
The wind load is 150 lbs. per lineal foot for top lateral system, and 200 lbs. per lineal foot for bottom lateral system. The impact increment is the live load multiplied by 100 and divided by the loaded length plus 150. Unit stresses used, tension 16,000 lbs. per square inch. Compression $\frac{16,000}{1 \frac{l^2}{9,000r^2}}$ for main web members and end posts, and $\frac{16,000}{1 \frac{l^2}{18,000r^2}}$ for chords, laterals, etc.

The floor is composed of four-inch planking, laid cross-wise on 6 x 6 inch wood nailing strips bolted to

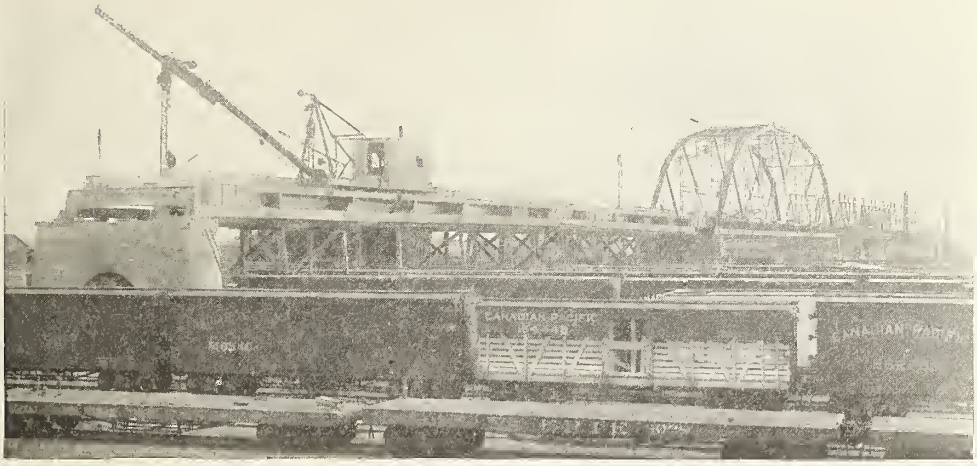
Beginning the erection of the northerly 250 ft. span the steel stringers. On the planking 3½-inch wood blocks are set on a bed of sand one-half inch thick.

The roadway is crowned two inches, the curve being provided for in the stringers. At the sides of the roadway are steel curbs formed by the outside stringers. These are each made of a deep 3/8-inch plate and 4 angles. The sidewalk is a three-inch slab of cinder concrete supported by the curb stringers and by I-beams on cantilever brackets.

The tracks are placed on the four-inch planking over a line of heavy I-beam stringers which span between the floor beams. Between these heavy stringers is a line of lighter I-beams, supported at two points by cross beams which are framed into the heavy stringers. The floor beams are 36½-inch deep plate girders, with 3/8-inch web and flanges of 2 x 6 inch angles. This floor system continues throughout the bridge with variations in the sizes of beams to conform with the length of spans (See sketch).



Arlington Steel Bridge, Winnipeg, Man.—Erection of the northerly 250 ft. span nearly completed.



Looking towards the south end of bridge, showing girder approach spans, 5-81 ft. spans, 1-250 ft. span, and, in the foreground, the 337.5 ft. span with the floor and bottom chord of trusses on false work.

Looking through the 337.5 ft. span.

The approaches are graded from the roadway level at the abutments up to the roadway level at the truss spans at a pitch of ⅞ of an inch in 12 inches. The floor beams are set perpendicular to this slope on differ-dange beam posts having their caps bevelled. The posts are braced transversely in pairs with longitudinal bracing generally in every second panel.

An expansion joint is provided every fifty feet by slotting the holes in the connections of stringers to floor beams.

The 81-foot spans are rivetted Pratt trusses 23 feet deep, 78.96 feet centre to centre of bearings, divided into 5 panels of 15.79 feet. 27.33 feet is the width centre to centre of trusses. Both the 250-foot spans and the 337.5-foot spans are rivetted Pennsylvania trusses. The depth between centre of gravity of chords for the former is 28 feet, 40 feet and 49 feet, at panel points where the top chord changes direction; for the latter 28, 43, 57 and 60 feet.

The 250-foot truss is divided into 10 panels of 24.66 feet, making 246.6 feet centre to centre of beams; the width centre to centre of trusses is 28 feet. The 337.5-foot truss is divided into 12 panels of 27.83 feet, making 334 feet centre to centre of bearings; the gidth centre to centre of trusses is 28.3 feet. All the trusses have pin bearings, and at the expansion end are set on rollers.

Throughout the bridge there is a fence four feet high, on the truss spans one line of fence on the outside of the sidewalk. On the approaches there is also a line of lattice fence on the inside of the sidewalk. At about every 75 feet a cast iron post is set on top of the fence, carrying an electric light. On the truss spans, and for fifty feet down the slope on approaches, the fence is made of galvanized iron and solid so as to hide the trains below from the horses. The remainder is latticed.

A feature of the work done in the shops of the Cleveland Bridge & Engineering Company is that all the holes are drilled, and drilled through all the members comprising a joint, at one time, instead of being separately sub-punched and reamed, as is the practice in America. This method ensures perfect fit at the connections. The accompanying photographs give an idea of the progress of the erection of the 337.5-ft. span. One view shows the floor and bottom chord laid on falsework on October 4th. Another shows the span on October 12th with the trusses and that bracing in place which would permit of the passing of the travelling crane.

Owing to the early closing in of winter and the low temperature, the sidewalk slabs will not be laid until next spring. Apart from this the erection is now completed.

Throughout the erection of the bridge, traffic was maintained in the railroad yards below.

The bridge was erected by Messrs. Frankman Bros., general contractors, Minneapolis. The excellent quality of the shop work greatly facilitated expeditious erection.

Montreal's Biggest Chimney

The C. P. R. has just completed the erection of the biggest chimney in Montreal. It is in connection with the addition to the Windsor Street station, and is part of a new boiler house near Mountain street, where the boilers for generating the steam to heat the wing to the station are situated. The chimney stands on a foundation of concrete 16 ft. square, running down to solid rock; it is 230 feet high, with the lower 90 feet of concrete and the upper 140 feet of buff brick. This body of brick has a panel course of gray terra cotta blocks spanned by arches of the same material, this of course being about 20 feet below a projecting course of terra cotta near the top. The panels and arches project about 4 inches from the face of the chimney and are backed by common brick, with circular reinforcing bands of iron ½ x 2 in. in size, laid between the two courses at regular intervals. The external diameter of the chimney is 17 ft. at the bottom, decreasing uniformly to 9 ft. at the top. The work was done by the Alphons Custodis Chimney Construction Company of New York.

C. P. R. Chimney at Windsor Street Station, Montreal

The arrangement for storing the coal at the boiler house allows it to be fed without handling, and the ashes will be discharged directly into cars for quick removal. The steam piping is carried to the building through a 300 ft. concrete tunnel.

Reinforced Concrete Telegraph Poles

Some reinforced concrete poles intended for telegraph line purposes have recently been constructed and tested by the British Improved Construction Company, Limited, of London, Eng. The poles were of square cross-section, hollow in the middle and with chamfered corners. They were tapered from top to bottom. The dimensions were 16 in. square at the base and 8 in. square at the top. The thickness of concrete was 2 in. throughout, so that the hole at the bottom was 12 in. square and at the top 14 in. square. The pole was 44 ft. 6 in. long, and for the purposes of the test it was fixed vertically and firmly embedded in a mass of concrete to a depth of 5 ft. 6 in. The reinforcement consisted of 248 wires, 3/16 in. diameter, of steel with an ultimate tensile stress of from 35 to 38 tons per square inch. The arrangement of the wires is shown in the cross section—Fig. 1. Fifty-six of the wires were assembled together in each corner. They were held in position by mild steel tie plates 11/16 in. by 1/16., spaced at about

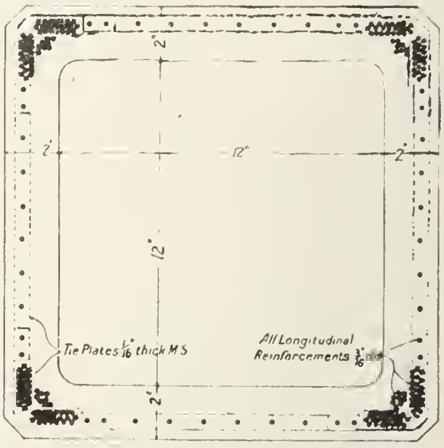

2"
2"
12"
2"
12"
2"
Tie Plates 1/16" thick M S
All Longitudinal Reinforcements 3/16" dia

Fig. 1—Section of bottom of pole

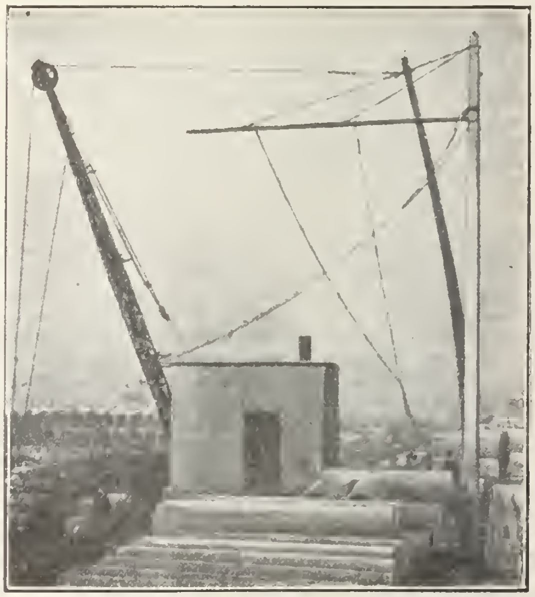


Fig. 2—Method of Testing

2 ft. centres apart, but no binding wires were employed. The area of steel at the base was about 6.85 square inches, and of the concrete at the same place 106 square inches.

The test consisted of exerting pulls of varying strength on the pole by means of a wire rope attached to the pole by a clip placed at a point 38 ft. 6 in. above the top of the concrete foundations. This rope was run over the pulley of a crane jib—see Fig. 2—arranged at a height approximately the same as the point of attachment of the rope to the pole, and was then taken down to a Salters' balance of 3 tons capacity graduated in half-hundredweights, so that readings might be taken. The balance was connected to a geared winch by means of a chain. The tests were carried out on the 10th, 13th, and 16th of October last at the company's works.

The test on October 10th consisted in applying varying loads up to 35½ cwt., and noting the deflection and permanent set, the load being released in each case, so that the latter might be measured. The loads applied were 3, 5, 10, 12½, 15, 17½, 20, 22½, 25, 27½, 30, and 35½ cwt. The corresponding deflections were ¾ in.. 2 in., 4¼ in., 5 in., 6¼ in., 8 in., 9 in., 10½ in., 12 in., 14 in., 14¾ in., and 19½ in. Up to a load to 22½ cwt. no permanent set could be observed. A load of 25 cwt. produced a permanent set of ¼ in.; of 27½ cwt., ½ in.; of 30 cwt., ⅝ in., and 35½ cwt., ¾ in. It is pointed out that to the above weights should be added 1 cwt. for the weight of the spring balance and chain.

On the 13th October seven separate tests were applied to the pole. In the first five, progressive loads were put on the pole, the maximum pull, deflection and permanent set being set out in the following table:

Test	Maximum pull in cwt.	Deflection in inches	Permanent set in inches
1	31	16½	½
2	35	18¾	⅝
3	40	22	¾
4	45	25½	1⅛
5	50	29	1¾

In the sixth test the load was gradually increased to 57½ cwt. At this point, when the deflection was 34 in., the chain on the drum of the winch broke. The pole flew back, and after vibrating for a short time regained its vertical position, and it was found that no permanent set was shown. In the seventh test the load was taken up gradually to 60 cwt. The deflection at this point is given as 37½ in., and the "permanent set" measured immediately after the release of the load was 2 in. After the expiration of an hour and a half, however, it was found that the deflection had become reduced to 11/16 in.

A slight hair crack was observed on the tension side about 5 ft. 6 in. above the foundation when the load was 33½ cwt. When the load was 36 cwt. slight hair cracks appeared at regular intervals of about 6 in. to 9 in. apart. At 41 cwt. a slight shear crack appeared, starting at 33 in. above the foundation and extending vertically at a distance of 2 in. from the tension side for 3 ft. 6 in. in length. At 46 cwt. hair cracks occurred regularly every 3 in. or 4 in. on the tension side. At 51 cwt. cracks on the tension side were noticed to be travelling across the sides of the pole to within 6 in. of the compression surface. At 61 cwt. (60 cwt. plus the weight of balance, &c.) the shear crack was more pronounced, and hair cracks on the tension side occurred about 1 in. apart. No signs of failure were observed on the compression side at this load, and as this was the limit of the gauge on the testing apparatus, the test was discontinued. For this test a more powerful winch and a spring balance of greater capacity were employed than in the tests on the 10th inst. The weights above mentioned must be increased by 1 cwt. for the weight of the balance, &c.

On the 16th October the pole was tested to destruction. There were two tests. In the first the load was increased from 20 cwt., when the deflection was 9 in., to 92 cwt., when it was 66 in. The permanent set was found to be 21 in. at this point, and the cracks on the tension side and the shear cracks were more numerous and pronounced. No signs of failure on the compression side were, however, observed. In the second test the load was again applied, and the first signs of failure were observed on the compression side at the surface of the foundation, when the pole was deflected 73 in. When the deflection had reached 78 in. the pole failed completely on the compression side. The amount of pull in this case has not been given to us.

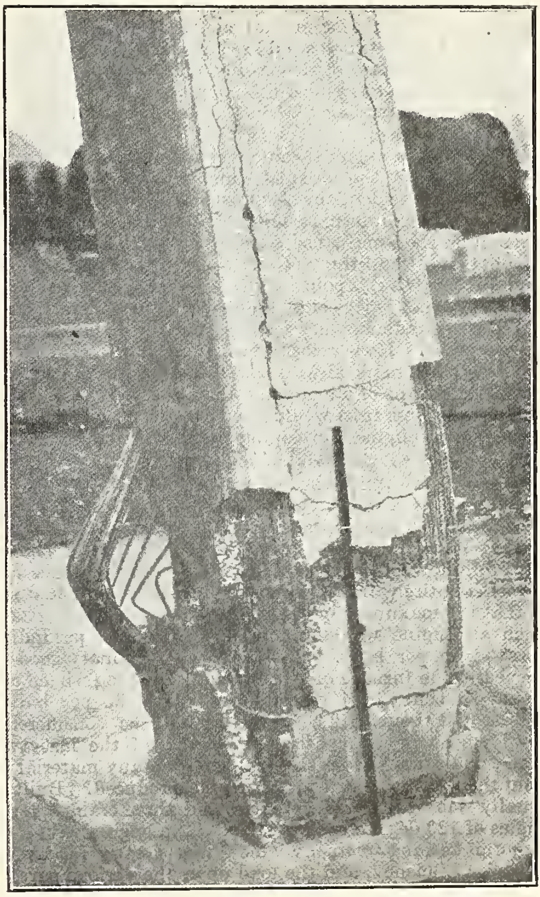


Fig. 3—Left side and back of pole after failure

The appearance of the pole after failure is shown in Fig. 3. We are informed that after the test the pole was found, on examination, to have failed almost equally for its whole length on the tension and shear sides, and that no signs whatever of local weakness were evident. On the compression side the pole showed signs of failure only from the base up to about 2 ft. above it. The total bending moment at the base of the pole is given as 4,863,936 inch-pounds. A 12-ton spring balance and a 5-ton winch were used in this destruction test, and two tons must be added to the weights given to allow for the balance, chain, &c.

The Relation of Engineer to Contractor

A General Criticism of the Varying Conditions Encountered in Present Day Contracts, with Particular Reference to Road Work*

By D. L. Hough

In approaching the subject of this address, in the treatment of which a seeming spirit of contentiousness might be apparent, the speaker wishes to make clear in the premises that there is nothing whatever in what he has to say, seeming or otherwise, that is in criticism of engineers individually or as a body. The suggestions that are made are directed towards a system, or, perhaps, to avoid the use of a thread-bare expression, a practice.

The speaker has had the privilege and the honor to work as a contractor under some very able engineers, and has fulfilled many contracts without a voice being raised, and completed the jobs with the feeling that his company had been treated with absolute fairness, and with the acknowledgement on the part of the principals that the work had been done by his company (the lowest bidder) well, honestly and without friction. On the other hand, he has done considerable work for concerns whose policy seemed to be based upon the belief that if the contractor was not losing money there must be something wrong, that the work was not being well done, or he was not doing enough; and has worked under engineers whose desire to return full value to their employers led them to be a little unreasonable, for they seemed unable to understand that that very attitude was indirectly opposed to the interests of their principals.

Looking at it broadly, the speaker believes that these engineers are the victims of a misunderstood policy rather than originators of a policy of their own. The speaker, perhaps, is in a favorable position to discuss the relations between contractor and engineer because for the first ten years after graduation, he was employed in that capacity, and when he looks back upon some of the ideas that he felt inspired by a conscious duty, and, unfortunately, had the authority, to enforce, he frequently feels that he ought to pay a personal visit to certain contractors and contractors' superintendents and industrial salesmen and try to square himself even at this late day.

Just as it is true that nothing helps a man more to admit and correct his own faults and shortcomings than the necessity of correcting the same faults and shortcomings in his growing children, so there is nothing that makes an engineer so realize the falsity of his point of view as a young man when serving as an engineer as to have some experience as a manager for a contractor. If the speaker were the manager of a great industrial enterprise, for instance, a railroad or a public utilities property, he would select for his staff only those engineers who had had at least a few years' experience on the contractors' side. On the other hand, he holds no brief from his fellow-contractors and this address is not intended as an apology or a petition for mercy in their behalf any more than it is a criticism of engineers as a class.

The Nature of Contracts

Taking up at first some general thoughts, later to be applied to road specifications in particular.

The principle of the contract is the actual foundation of all social, business and professional relations and economics.

Mutuality.—The very essence of a contract is mutuality; and the more this most important principle of a contract is kept before our minds, the more faithfully will the contract be carried out and the less will be the friction developed. In fact, as in that well known rhyme, in that very statement, my story is begun, and it might be considered that my story is done, because, if the mutuality of a contract is kept always before us, and it is understood that when a contract is once signed the parties thereto have equal rights thereunder, are on an equal footing, and that there is nothing in contractual relations that places the party who pays with his money on a higher plane than the party who pays with his materials and services or vice versa, and if the engineer considers himself a non-partisan arbitrator, there is nothing left to be desired; and what the speaker has to say deals most largely with this fundamental element of contracts.

The original contract was verbal, and the original contracts were carried out at the moment of their making, whether it was a matter of barter, with the exchange of commodities on the part of both parties thereto, or a consideration for a service rendered.

As time went on, the mortality of the human being and the frailty of the human memory required that a record be made of a contract, which at present requires that it be reduced to writing. But every contract, written or otherwise, must have in it at least the implication of that essential consideration without which it is no contract—the mutuality thereof—whether it be the price mark upon a tin whistle, or the elaborate agreements drawn between two great institutions by profound students of the law.

Concise Contracts.—The less a contract has in it, provided it covers the points at issue, the safer it is for both parties. There is no better contract between honest men than a verbal contract. Upon such a contract the minds usually meet and there is no "trimming," nor any attempt to see how much can be gotten out of the party of the one part, nor how little may be given the party of the other part, as such contracts are only made and carried out between men who trust each other.

It would be a very excellent thing if all those who draw contracts might realize that the more they go into detail and the tighter they make a contract in certain points, the weaker it is with regard to those considerations that may develop that are not covered in detail. If a contract were drawn to lay down one or two general principles as to the relations to exist between the principal and the contractor, and then state that all matters that may arise are to be adjudicated upon those principles; and then if it could be understood that the engineer, made the arbitrator under the terms of the contract, was actually as such the agent of both the parties thereto, most of the difficulties that arise and the friction that develops would be eliminated.

The Making of a Contract.—What are the circumstances that lead to the drawing of a contract? An individual or a group of men want something manufactured or constructed that they neither have the knowledge nor experience nor the equipment to manufacture or construct for themselves; they retain an engineer chosen as an expert in such matters; they outline to him what they want; he studies the physical conditions, if it be a matter of construction, with which we, in this Congress, have most to do; he draws a plan setting forth the limits of the structure, and prepares a specification as to the qualities of the materials, and the methods of construction, and the character of workmanship; and a contract is drawn setting forth the terms under which his clients are willing to pay their money, as the consideration, for the construction.

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*An address given before the First American Road Congress at Richmond, Va.

This is then submitted to contractors for them to make their offers, and right here develops one of the great disadvantages of the present practice. Instead of permitting the contractor to make suggestions, as to modifications of the plans or qualities of materials or methods of construction, in advance, so that he may make a better price or give better satisfaction because of his experience and the nature of his equipment, too often the contractor will not be heard and he must make his proposal absolutely under the terms of the plans and specifications, and after signing the contract it is too late for changes. Discussion usually results in friction.

Ultimately the contractor is selected, a contract is signed, sealed and delivered; the principal appoints an engineer to look after his interests during construction, and in so far as he lays out, directs and inspects the character of of materials and workmanship, the engineer is properly the representative of the principal; but under the terms of those clauses where he is made the arbitrator, interpreter and estimator, he is the representative of both parties and should be absolutely non-partisan.

The Engineer.—The suggestion has often been made that the engineer is in the employ of and paid by the principal and should, therefore, serve his interests first. This is not the case. If he were employed by both concerns, that is, if his fees were paid partly by the principal and partly by the contractor, that portion borne by the contractor would be added to the contractor's estimated cost and would be in the contract price. If the principal prefers to pay this portion of the engineer's salary direct, then the contractor leaves this sum out of his costs.

Actually, therefore, the engineer in so far as he is the arbitrator, that is, is made the final court of appeals under the terms of the contract by both contractee and contractor, he is the employee of both and must not be partisian; and if he is partisan, he is not faithful to the trust reposed in him by the other party, however shocking this statement may sound to those obsessed by the present practice.

It is with delight, however, that it may be said that ordinarily the broad-minded, capable engineer outgrows this narrow point of view, and the more broadly an engineer interprets a contract, the bigger he is, and if the records of the big men in the engineering profession are studied, it will be found that those at the head of the profession are they who have been the most fair in the adjudication of contracts.

The too strict and strenuous enforcement of the narrowest interpretation of a contract, although not confined to young men, is essentially an attribute to young men, and it has frequently been stated that one of the reasons that one encounters so often among important manufacturing and contracting concerns the policy of refusal to bid for government work is that the young men just out of the Government's engineering schools immediately becomes a chief engineer, and the final court of appeal in the interpretation of contracts, before he has recovered from his training as for war, wherein the orders of an officer must be obeyed and all is fair that helps your side to win, and before they have become seasoned to commercial life, wherein mutuality should prevail. A warrior too, is the finest example of a partisan.

There is the added condition that the government engineer, with his great pride in his corps, loses a little of his sense of proportion, and unconsciously follows the theory that he must avoid not only evil, but the appearances thereof, with the result that the rights of the contractor are lost sight of.

Here again, I want to reiterate that it is a habit, or perhaps a tradition, that is discussed; there are engineers in the Government service, both army and navy, who are as fair as any men that live, and in whose hands a contractor's rights are appropriately respected.

In private work where there is usually some senior official to whom appeal may be made, the presence of the young man as the construction engineer is not so menacing, in that appeal may be made beyond. But here, again, the contractor is at a disadvantage, in that frequently it is very difficult for even the biggest and broadest of engineers to go on record reversing the ruling of the subordinate; first, because it may weaken the strength of the subordinate, and, second, because it is more or less embarrassing to seem to be giving way to the other party.

Litigation.—It has been frequently said, and the speaker has had it said to him: "You know, of course, if you think I am unfair, you have the right to appeal to the Courts." This, naturally, is true in connection with every sort of contract except those with the Government or the State. But what is the result? One must wait three or four years for the case to come to trial; then become the victim of the relative cleverness of counsel and the lack of understanding or bias of the jury.

In the end, a compromise verdict may be obtained, but this results in only a partial recovery for the contractor that must be further reduced by the expense of litigation, counsel fees, witness fees, and loss of his own time in preparation of and presence at the trial, and, in addition, the grave impairment of the contractor's earning power, in the inability to take other work because his capital is tied up.

For this very reason, an engineer ought to be scrupulously fair to the contractor and keep him out of the courts, rather than a little unfair on the ground that he wants the justification of the court's decree before he gives up to the contractor something for which he may fear criticism. There is possibly some slight excuse for this in the case of a public servant who is always the target for criticism and investigation, but still there is a little weakness present in even the public servant when he does a wrong, no matter how slight, for the benefit of his personal security.

The Contractor.—To turn to the contractor; there are bad contractors as well as good contractors, and this is true of every trade and profession. There are contractors of whom it is said that as soon as they sign a contract they look it over to find the weak spots developed by the very presence of clauses that are too stringent, who study where it may be beaten. It is the justification of most engineers that admittedly unfair clauses are included in contracts to protect them against the unfair contractor, and that if they meet a fair contractor these will not be enforced. It is an old adage that two wrongs do not make a right, and if the average man sat in arbitration upon a contract of this sort, the evident unfairness of the contract should cause him to be more careful in seeing that fairness be done, even to a contractor who has an unfavorable reputation.

Further than this, no contract was ever drawn that some unexpected condition might not arise that would be found not to be covered by the clauses therein. It is human in such an event that the contractor who is tied up by an unreasonable contract should seek his oppotrunity to square himself.

The speaker has sometimes wondered how much of the tradition that the old-fashioned government and municipal contractor was a rascal grew out of the fact that the old-fashioned contractor was usually not an educated engineer and had to depend upon some man of alleged training to make his estimate, and, finding that he had been led into a ruinous agreement, tried to pull through as best he could. Has it occurred to you that wherever there was actual foundation for the condemnation of a contractor for corruption, there was also present, corruption on the other side?

In what follows, no reflection is intended upon the fine, up-standing, sterling character of many of the men who have spent their lives in contracting, and to whom the stability, efficiency and fine appearance of most of our structures in this country are due.

But to-day contracting has become a business in which organizations have been built up of quite as high a character as in any other line of industrial effort; in recent years there has been brought into its conduct, integrity and intelligence equal to that found in any other line of activity. There are two reasons for this.

First: The fact that our technical schools are turning out each year such a vast number of young men trained not as engineers, but prepared to receive the training of engineers. These young men, entering the field of engineering, soon find the market for employment over-supplied, and, securing a job, find the opportunity for advancement limited, while anybody can take his chance at securing a contract and the alleged greater independence of the contractor appeals to his ambition.

Second: The character of contract work now offered is of a much higher grade than the elementary work from which it grew. It takes just as good a man acting as managing engineer for the contractor to carry out the work as it does to design and lay out the work.

Changed Contracting Conditions.—The changed conditions can be no more fittingly illustrated than by the incident that was recently called to the speaker's attention. Some foundations were being built for an oft-mentioned bridge by a contractor who had picked out a foreman from another organization with which he had been associated in a business capacity. This foreman was particularly in charge of the concrete mixer; the unit batch requiring three bags of cement under the specifications.

One day the inspecting engineer came to the contractor with the statement that, perched upon the superstructure of a portion of the bridge already completed, he had watched this foreman for two hours putting but two bags of cement into each batch. He further said that the bottom footing course into which that particular concrete was going was of such a nature that he considered the leaner concrete wholly sufficient for the purpose. As a consequence, he would not insist upon this concrete being taken out, thus imposing upon the contractor considerable expense, as he felt sure from his personal acquaintance with the contractor that the holding out of the cement had not been perpetrated at his direction or even with his knowledge, but he insisted that the foreman be removed from his position in charge of it.

The contractor had a talk with the foreman and explained to him that he did not want to have his work done that way; first, because it was dishonest; second, because the concrete might have gone into some part of the work that, failing, would have ruined his reputation; and, third, because it would hurt him as a business proposition if it were known that he was a contractor who habitually "beat" his contracts.

The foreman protested that it had been the habit with his previous employers, and that what he had done, he had done for the best interest of his present employer, and it was evident that he could not understand the great injustice seemingly done him, and the seeming ingratitude of the contractor. He was told, however, that he would have to go. Two days later word came to the contractor that this man had gone home, had brooded over the unfairness done him, and had committed suicide.

Regrettable as was the tragedy resulting, there are two things that it accentuates.

First, that the contractors of the present day realize the importance of the structure they are building and want to do honest and fair work, and must do it if they are to succeed.

Second, the fair and reasonable attitude of the inspecting engineer. Under the terms of the contract, he had the right to order out the concrete, and the contractor could not have grumbled if he had. Perhaps the concrete in this footing should have been made of a separate class, but the engineer recognizing the situation, allowed it to remain in place, making the very appropriate insistence that the price paid for the batches should be reduced by the value of the cement omitted.

There must be two sides to a contract as is implied by the very definition of the word, and the presence of and the surveilance by, the inspectors of the one side are a benefit to the other. It is but human nature for a contractor's foreman when he has made a mistake to try to hide it or to make the best of it. The scrutiny of an inspector often prevents the harm that might result to the contractor because of the failure of that part of the work where the error was made, or its detection at a time when the expense of re-placement would be embarrassing. The more, however, this sort of reasonable "give and take," as set forth in the illustration, is practiced between the contractee and the contractor, the better will be the character of the work done and the cheaper the resulting costs, for, as pointed out heretofore, if conflict develops, the contractor must stand an actual loss even if he recovers at law, and there is additional cost to the contractee in the defending of the case and frequently in the delay resulting because the contractor is forced to throw up the job.

Allowing for Contingencies.—It is almost the universal experience in contracts that include deep excavation that the character of the excavated material, not having been developed by previous work in the same locality, is found to differ from that expected, no matter how carefully exploration and investigation may be made. The samples from a boring in many cases cannot show the condition of the soil as it exists in its original position.

The courts have frequently, and recently, decided suits growing out of such conditions on the broad basis that the contractor should receive a dollar for a dollar's worth of work, and that it cannot be expected that a contractor in the limited time allowed him shall check and duplicate investigations made by the engineers of the contractee during a protracted period.,

The advantages of a clause under which the unexpected conditions might be considered and a price arrived at by the rule of three, based upon the price named for the material as it was indicated, are so evident that it is a surprise that such a clause is so infrequently found.

Guarantees.—There has appeared in recent contracts drawn by lawyers of national reputation, a clause calling upon the contractor to guarantee the efficiency and sufficiency of the design. This clause could not have been drawn by an engineer. The engineer who would frame such a clause would seemingly have a very poor opinion of his own qualifications and very little courage as to his own convictions. Consider for a moment such a clause. The contractor is called upon to make a bid to build something of a certain character, of certain materials and in a certain way; no matter what the conditions that he meets may be, no matter what the inefficiency or the insufficiency of the original design, he must make good without any change in price and he cannot have the work unless he accepts this condition.

Could anything be more unfair? The party of the one part goes in record that he considers that his design is efficient and sufficient. If he does not believe it, the contract is dishonest. If he does believe it, then why should not the contractor who lacks the information and the experience believe it; and if things turn out differently, why is not the contractee as much mistaken as the contractor

It would seem that there is no possibility of a difference of opinion on the point that with differing conditions a different price should be made; and yet such a contract has to go to the courts where the lawyers of the one side will contend that the written instrument must prevail. Whether this expression will hold in Court has not yet been determined, as it has never been brought to issue. Under the conditions developed by one contract in which this clause is included, if it is held to be proper by the courts, a contractor will be wiped out. If it is held as not legally binding, then the actual cost of the work will be very much increased to the contractee, in that so much time and money were wasted in trying to hold to the specifications that later on were modified.

The purpose of his example is to point out that there is always considerable "flare-back" in an unfair contract, and that given a fair and reasonable contractor, a fair and reasonable contractee, and under the arbitrative authority of a fair and reasonable engineer, contracts should be drawn so that they may be automatically and not autocratically modified to meet actual conditions as the work progresses.

Labor Clauses.—There is another clause that may well be in every contract, particularly with state and city governments; one that will set forth that the contract is based upon the prevailing rate of wages and the prevailing hours of work at the time the contract is signed. Then if those who control our destinies through the Legislature find it advisable to limit the hours of work or to pass legislation that shall affect the prevailing rate of wages, that an equivalent increase shall be made in contract prices.

The speaker has no quarrel with labor or labor unions; he wishes to see the men get all the money justifiable, and wishes to pay them as much as anyone else, and prefers to see the wages fixed so that all contractors are on the same basis and appropriate punishment devised for those irresponsible contractors who cut prices and do not pay their men. But it seems definitely unfair that a State should make a contract with an individual to do certain work at a certain price and then, thereafter, proceed to increase the cost of the work by reducing the hours of labor or increasing the rate of pay without an equivalent benefit to the contractor who labors harder than any of his men.

Road Specifications

Turning to the standard road specifications of the various States, it is found that the work of road building presents but few items. The mere construction of a road is quite elementary. Specifications may be made so brief that there seems but little opportunity to discuss them and the plant required to construct a road is so simple that it would seem to put road construction into the hands of any man who may buy picks and shovels, a few carts, and a roller and sprinkler.

But as one studies a little more carefully, one sees that it is not the actual construction that presents the difficulties. It is more a matter of organization and transportation. There is so little work in any one locality that proportionately vast amounts of money may be lost by momentary delays or the breaking up of the organization by breaking up the sequence of the work; and in the securing of materials the plant required, instead of being almost negligible at a percentage of the total cost of the work, may become a very important percentage.

For this reason the engineer should be most careful to point out the difficulties to be encountered when he prepares his schedule of information to be furnished prospective bidders, and in this particular the speaker finds the road specifications of none of the States adequate.

The engineer who is engaged to prepare the specifications for a road contract, knowing what he wants in the way of a road and of what materials he wants it built, should describe not only the actual location of the road and its grades and cross-sections, but should investigate the sources of materials. They should point out to contractors what rock they are willing to use, where it may be found; what sand they are willing to use, where that may be found, either along the line or within reachable distance; the stations of railroads most accessible to the sources of supply of material; and the highways by which access may be given. Such information would result in lower prices in many cases, and would prevent the presentation of bids at to low a price because of a lack of information, with the result that the contractor fails and the work must be relet with the delay and additional expense that must ensue.

Then the location if the highway should be studied at every point from end to end, and the desired treatment set forth in detail, and there should be a general clause outlining a basis for the adjustment of prices to meet any condition that may reasonably develop.

The securing of materials and their transportation to the point of construction of the highway form one of the most important elements in the building of roads. There are, of course, localities where this is reduced to a minimum because the materials may be bought more cheaply than produced.

Organization and uninterrupted procedure with the work are the most important considerations of all. Where the contractor must produce his own materials and deliver them with his own facilities, a road building contract becomes practically a manufacturing and transportation proposition, and it takes an unusual order of ability and much versatility on the part of the contractor to do good work.

Excavation and Fills.—Turning to the actual construction: The speaker finds in most of the specifications but one item for excavation, and in this is included the more or less immaterial item of grubbing and clearing; the specifications generally set forth that stump must be excavated to such a depth as the engineer may direct, and the excavation filled with such material as the engineer may approve. There should be a separate item for this character of excavation. The amount of this work cannot be determined in advance, nor can the individual preference of the individual engineer be known to all the bidders. It is true, however, that within the limits of the most exacting the cost of this character of excavation is about the same, shovelful for shovelful; but it is very different from the general excavation of the road in preparation for the road metal, and as it may vary so widely, it would seem to be but fair to the contractor to have this in a separate item.

Then as to the material of backfill; the engineer for his own protection and comfort should accurately describe the character of the material he will require, and should point out where it may be obtained, unless he is willing to take the material from the excavation.

It would be, perhaps, a benefit in securing proper prices and avoiding discussion later, if a separate item were made for the excavation for drains, foundations and for culverts. In some instances the specifications call for a separate price upon this, and this is left to the engineer to determine the width and depth of the drains as the whole work progresses.

In the matter of borrow, appropriate borrow pits should be located by the engineer and their location pointed out to the prospective bidders, and to insure fair play between all bidders, the royalties to be paid should be negotiated in advance and the costs set forth in the information given.

Rock excavation seems fairly treated, but the information to bidders should clearly set forth whether or not this rock may be used in the road construction, and if it is a question that can only be determined as the work progresses, then there should be two prices; one when rock from the excavations may be used, and one when the excavated rock must be spoiled and the road metal obtained from special quarries.

The details of pipe and open drains, of culverts and similar items seem to be sufficiently treated.

The restrictions as to the character of labor and superintendence and the cleaning up after completion are, in every case, usual and reasonable.

Local Ordinances.—There is one element, however, that ought to be gone into, either as a separate item of the contract setting forth just what the limitations may be or else be outlined in the information given to the bidders; namely, that, where the road passes through communities where there is control by special legislation or ordinances, that the terms of these ordinances, or at least, their existence, be pointed out, and in the latter case, the contractor be informed where he is to go to determine what their effect may be upon the costs of his work.

Delays.—In none of the contracts is there any provision made in the event of delay on the part of the communities in the sale of their bonds, or for other reasons not securing the funds with which to pay the contractor.

The only consideration given the contractor by the contractee is his pay. The terms of the pay are clearly set forth and the times at which the contractor may expect it.

It is only fair and reasonable that if there is any delay in making payments to the contractor that he should be given interest from and after the date at which the payments are made due by the contract. The rate of interest should be the same rate of interest that the community pays on its bonds or other obligations upon which the money is raised. Then, and in that event, the contractor may hypothecate his warrants and borrow money to permit him to continue.

An alternative to this suggestion, but a disadvantageous one to the contractor, would be his right to suspend work until he received his pay, in which case, all reasonable costs during suspension should be estimated to him by the engineer. These should include not only the actual maintenance cost of plant, materials and watchman, but the cost of disorganization and reorganization. If these cannot be determined by actual vouchers, then it should be arranged that they may be agreed upon, possibly, by arbitration.

There should be a clause covering delays due to failure to secure right-of-way or to injunctions imposed through no fault of the contractor, and remuneration should be arranged.

Sequence of Work.—In road building, the most important general consideration is the sequence of the work. This should be definitely set forth in a clause of the specifications or in the information to bidders, so that the contractor may properly plant his job and properly organize it. The ideal arrangement is to start at strategic points and proceed as an army marches, one process following the other at the right interval of distance, so that the operations may be kept as close to each other as possible for the purpose of supervision and so that the man in charge of the delivery of material may make his deliveries in proper order and may be forehanded with all supplies, and so that any excess or deficiency of materials may be corrected with the least possible transportation cost.

Any interruption or modification of the sequence of the work not in accord with this ideal procedure should be pointed out in advance or a clause should be drawn that will give the contractor a reasonable profit, for unexpected interruptions either in time or sequence.

The contractor should not be made subject to the indidual preference, and one may perhaps say fancy, of the directing engineer or some irascible property holder along the route, without facilities for his proper safeguarding in unusual costs.

Maintenance.—With regard to maintenance: ought not the terms of this requirement to be adjusted relatively to the nature and amount of traffic developed that cannot be measured in advance? Often the very existence of the road creates unexpected conditions. The contractor should be paid in proportion to the cost.

Substitutes.—It would seem valuable also to incorporate a clause which permitted substitutions to be made, if during the progress of the work this were found to be of value.

If something different from that set forth in the specifications is substituted in the way of materials, the owner should naturally have the benefit. If there is a reduction in the cost of transportation or otherwise due to the ingenuity of the contractor, it should go to him, and in this way again, the mutuality of the contract would be fulfilled.

Ideal Contracting.—It may be said that the suggestions that have been made are visionary and, to say the least, Utopian. The best defence of them, however, may be seen in the specifications that have recently been drawn for the carrying out of one of the two or three most important enterprises now under construction.

The information to the bidders in these contracts covers every item recommended in this paper, and goes into a greater refinement of detail, because of the greater diversity of the work involved. It calls attention to the character of the work that will be demanded, points out the necessity for rigid inspection, and great care in execution. It goes into the utmost detail as to the character of the rock and earth to be encountered in excavation as determined by explorations made by the engineers, and to work of a similar character that has been done in the same localities. Information was even given as to the character of weather prevalent at the various seasons of the year in the various localities.

The plans are drawn after lengthy, exhaustive consultations with contractors experienced in the same character of work, and having determined the capacity desired, the cross-sections are those that may be obtained with the least expenditure of effort and money, and the greatest saving in time.

The specifications are accurate and descriptive; different characters of work are broken up into items that make it possible to figure clearly the costs, regardless of the conditions met.

The spirit exhibited by these specifications is an example to all who draw them, and it is a spirit that may be applied to any character of work, no matter how elementary.

The items in the bid are so numerous and analyzed into such figurable elements that it is practically not to be considered that any emergency may arise that may not be covered fairly and appropriately by some item or combination of items in the contract, and the theory upon which quantities were estimated is fully described.

There is nothing in which the engineer should be more careful than in publishing the estimated quantities. It is the practice of most modern concerns when bidding upon important contracts to check the quantities accurately, but the engineer has more information, and it is unfair to the contractor if he does not make his estimates accurately and publish the facts.

What has been the result of the fairness of these aforementioned specifications? The very best and most substantial contractors in the country have been competitors for the work, and the bidding has been so close as to justify the belief that the element of fortuity has been largely eliminated.

Conclusions.—In closing the speaker would urge upon engineers to draw their specifications so that they are fair and reasonable, to assume always the attitude of a non-partisan when arbitrating those clauses where they make themselves the final court of appeal, to try to consider that the contractor is an honest man, and to work with him on that basis until he proves himself otherwise.

It may be hard for an engineer who has drawn a specification and who knows in his own mind what he intended the specification to mean, to accept or even consider the point of view of the contractor who reads the same clauses from a different interpretation. In such a case, the contractor's and the contractee's minds have not met and the engineer, not being able to divorce himself from his point of view, should be readily willing to present his interpretation and let the contractor present his to an open minded arbitrator.

Perhaps an arbitration clause in every contract would eliminate most of the trouble, and the speaker is inclnied to favor the suggestion so often made that the courts of every State should have a special branch that might be called a contractors' court of arbitration; and that this should be in a way a court of appeals to which access might be had throughout the work, and to which the engineer and contractor might go hand in hand, and not one drag the other.

The judges appointed to sit on such a bench should be in the proportion of two widely experienced engineers who have advanced to that time of life when they can look at things rationally, and one lawyer chosen not for his profound respect for the written instrument, but for his good sense of proportion, for the broad equities in the contract, and may they all be inspired by the conviction that the contractor should have a dollar for a dollar's worth of work.

Discretionary Power of City in Purchase of Property

Some light upon the discretionary powers of the city or municipality in regard to the purchase of property for extensions is given by a decision handed down recently at Montreal by Mr. Justice Charbonneau.

The case was that of Jas. Birchenough, who sought the issue of a writ of injunction to restrain the City Council and the Board of Control from purchasing certain lands for the purpose of enlarging the present sewage farm at Back River. Petitioner represented that the price which the city authorities contemplated paying for the land ($71,680) was excessive, inasmuch as the land was valued on the civic rolls at $11,105, and the present proprietor, as a matter of fact, had endeavored to dispose of it last summer for the sum of $36,000. Hence the petitioner sought to have certain resolutions of council and of the board dealing with the subject declared illegal and irregular.

The Court, however, stated the principle that the law of supply and demand had a great bearing in the matter of fixing the price of properties. The mere fact that the land was contiguous to the sewage farm, and was probably the only piece of land which the city authorities could possibly acquire for the purpose of enlarging the sewage farm, ipso facto, rendered it more valuable. Hence the only question to be determined was whether the necessity of bringing about enlargement operations in connection with the farm was such as to justify the city authorities in paying a greater price than the actual intrinsic value of the land. This was, admittedly, a question with which the city administration and not the court was competent to deal.

The members of the administration were the duly elected representatives of the people and were placed in office for the very purpose of dealing with subjects such as that of estimating the price of land to be purchased by the city.

As to other contentions of the petitioner, to the effect that, according to certain clauses of the city charter, the city executive could not acquire the land in the manner mentioned in the present instance, but had powers to expropriate by giving twenty per cent. over and above the actual valuation of the land, the court maintained that such clauses did not apply in the present instance. The disbursement covered by these restrictions of the charter referred more especially to expropriations for street making, road widening and sidewalk work. The charter section referred to must of necessity be interpreted in the light of the context, and, according to the latter, the works referred to were more especially those mentioned above.

In other sections of the charter where sewer works are mentioned, no mention of the city's power to expropriate was contained. Accordingly, in the present instance, the work which it was contemplated to bring about was a species of sewer work, inasmuch as it involved an enlargement of a sewer terminus—or the sewage farm. Hence the Council and the Board of Control necessarily possessed such discretionary power in the matter as was generally accorded all legislative and administrative bodies. As a consequence, the application for a writ was dismissed with costs.

North Vancouver's Good Record

The City of North Vancouver, B.C., which has a population of only 6000, expended during 1911, no less than $866,000 on street improvements. Details of the work of the engineering department are furnished us at our request by Mr. George S. Hanes, B.A.Sc., City Engineer. The expenditure for sanitary sewers was $312,000, the work comprising 44,240 lineal feet of main sewers and 51,070 lineal feet of branch sewers, ranging from 4 to 18 inches in diameter. One hundred and five manholes and 64 lamp holes were constructed under this heading. The amount expended on storm sewers was $78,000, made up of 12,065 lineal feet of main sewers and 3,880 feet of branch sewers 18 to 24 inches in diameter, as well as 67 manholes and 151 catch basins. The grading of streets to permanent bench grades in the business section of the city amounted to 50,300 lineal feet and 236,000 cubic yards of excavating, the whole costing $234,000. On water works $156,000 was spent, this representing the laying of 17,727 lineal feet ot wood pipe 4 to 16 inches in diameter, and 29,314 feet of cast iron pipe 6 to 10 inches in diameter, as well as 63 hpdrants and 214 gate valves. On rough grading and clearing streets, the construction of wooden sidewalks and macadamizing roads, $78,000 was expended. Park improvements cost $8,000, bringing the total up to $866,000 as above. During the active season the city engineer's staff consisted of three assistant engineers, one draughtsman, one office clerk, 13 sewer inspectors, a board of works superintendent having the direction of about 350 men working on day labor, a water works superintendent with over 300 men on day labor, and sewer and grading contractors with a force of about 750 men,—a total of some 1400 men working at one time for the city. Two steam shovels, together with two locomotives and dump cars, were used on some of the street grading contracts. The sewers were all tested to stand a head of 10 ft. of water without leaking. The water mains were tested to 300 lbs. per square inch before backfilling the trenches. A fire main was laid through the centre of the city with a pressure of 270 lbs. per square inch in the down town section,—the water works being a gravity system.

The City of North Vancouver was incorporated in 1906 and Mr. Hanes has been city engineer since January 1, 1909. Mr. Hanes was formerly City Engineer of Windsor, Ont., the period of his incumbency there being from March, 1906, to December 31, 1908.

1911 An Active Year at Victoria, B.C.

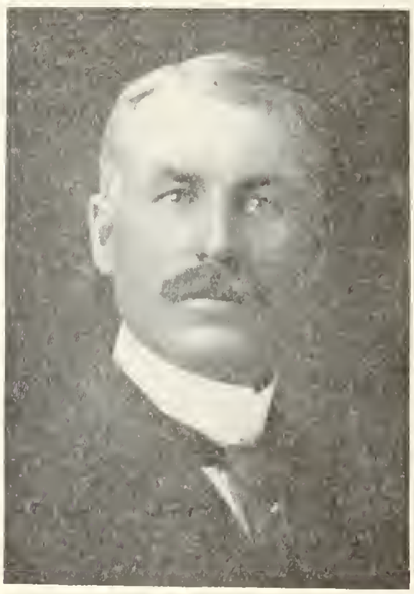
During the year 1911 a considerable amount of work was carried out at Victoria, B. C., under the superintendence of Mr. Angus Smith, the City Engineer.

Over two hundred by-laws were passed during the year, these covering grading, draining, paving, streets, sidewalks, curbs and gutters, boulevards; sewer, surface drain and water laterals for no less than 183 streets and sections of streets,—the whole costing nearly four and a quarter million dollars.

Surveyors have given lines for 27 miles of cement sidewalks and for 35 miles of curbs and gutters. Eight miles of streets have been staked for sidewalk and curb and gutter.

Surveys, plans and descriptions have been made for the following widening schemes and extensions of streets: Hillside avenue, Pandora avenue, Douglas street, Block "W" Lane, Pembroke street, Pandora Extension, Fairfield road, Front street, Fort street, McKenzie street, Leonard street, Chester street, Burdette avenue, Dunedin street, Oxford street, Moss street, Lansdowne road, Fishguard street, Edmonton road.

Various surveys for expropriation, sewer and surface drain right of ways through private property, encroachments, subdivisions and lines for building, electric light and telephones have been given on 210 streets and on 24 streets for water pipe mains.



Mr. Angus Smith, City Engineer of Victoria

The above work necessitated the preparation of about 450 plans for the City Solicitor, nearly 400 plans for subdivisions copied from the Land Registry Office plan, and the recording of nearly 250 monuments.

Adding to the beauty of the city and its fine streets, close on twenty miles of boulevards, with widths varying from six to eighteen feet, have been laid and planted.

The roads construction department also passed through a large amount of work for the year, including sidewalks (on 74 streets) of a total length of 27 miles, and curbs and gutters (on 86 streets) of a total length of 36 miles.

The city has completed approximately 333,756 square yards of paving,—equivalent to twenty-one miles of thirty-foot roadway. The number of yards contracted by the city was 726,421, or approximately forty-six miles of thirty-foot roadway.

There has been passed by the Council and accepted by the citizens nine miles of pavement which has not yet been let. There has also been ordered by the Council but not yet reported on by the City Engineer, approximately eight more miles of pavement.

A considerable amount of work was done in the extension of the surface drainage system, thirty-six miles of street drains with thirty miles of four-inch lateral connections having been laid. The excavation for this work totalled 108,000 cubic yards.

The main sewerage system has been proceeding rapidly. Sewers were laid on 102 streets to a length of fifteen miles. A septic tank was constructed on Superior street for about thirty houses.

A reinforced concrete bridge is in the course of construction to carry the main sewer from Hollywood Park to its connecting point with the eastern section main sewer.

Surveys, plans and profiles were made with full details for the construction of the two important systems of sewerage, viz.: the "North-East" and "North-West." The line of the northeast main sewer has been located from its outfall at Oak Bay to the intersection of King's Road and Prior street. All surveys for the location of the submerged outfall in Oak Bay are completed, and the specifications for the construction of the Oak Bay sewer are ready.

Survey plans and profiles have been made for the construction of a deep level combined trunk sewer in Victoria West. Plans and profiles have been made of all sewer and surface drain extensions and of all streets improved in 1911, showing grades of sidewalks, curb and gutter and street intersections.

In addition to the above works the city has constructed under contract a fore-shore protection sea wall on Dallas Road, between Montreal and Menzies streets. This wall is between 1,700 and 1,800 feet long and is 26 feet high. The roadway, which is protected by the wall, will be paved and lighted, making this one of the many picturesque drives in the city. The seawall will cost approximately $140,000.

Another wall worthy of mention is being constructed in Ross Bay, from Clover Point to St. Charles street, approximately 3,800 feet in length. This wall is of a different design from the Dallas Road seawall, but each of the walls is unique for its purpose and is an object lesson in the particular style of construction.

The cost of the Ross Bay sea wall when completed with the necessary walks and driveway, is estimated at $160,000.

Plans and specifications were prepared for the two fire halls built, one at the corner of Fernwood and Cedar Hill Roads, and one at the corner of Cornwall and Fairfield Road; also for two public conveniences. swimming pavilion, and incinerator.

During the year the average number of men engaged and working daily under the City Engineer's Department was 1,137. Taking the average earnings of these men at very nearly three dollars a day, the City has paid for the year in wages alone over a million dollars.

Extensive work was carried out in connection with water mains, about 35 miles having been laid.

A spillway dam of the Ambursen type, 510 ft. long and 40 ft. in maximum height, will be constructed across the White River 2 miles above Forsyth, Ark., for the Ozark Power & Water Company. Adjoining the dam is a power house to contain ultimately five 1500-kw. units, all running on the minimum flow of the river. There are no regulating or sluice gates, as the whole flood discharge of the river, estimated to amount to 110,000 sec.-ft., will pass over the crest of the dam, which will be submerged 15 ft. The river has a drainage basin of about 4500 square miles at this point.

Montreal a Great Building Centre in 1911

Office of "The Contract Record and Engineering Review"

Jan. 6, 1911

Montreal had a busy year in the building trade, which resulted in the addition of several structures which are among the most important and imposing in the city. This applies particularly to the commercial districts, where values in real estate increased to an enormous extent. Old properties have been demolished and large office buildings erected on the sites. The two chief structures of this character are the Transportation and Dominion Express offices. Other buildings constructed for commercial and factory purposes in different parts of the city are for the Wilson Paper Company, the Gillette Safety Razor Company of Canada, the Blumenthal firm, the United Shoe Machinery Company of Canada, and Henry Birks & Sons, Limited. The C. P. R. had a big building programme, the chief features being the extension of the Windsor Street station and the reconstruction of the Place Viger station, while the new Art Gallery, the Normal School on Sherbrooke street, the new Y.M.C.A. building and the addition to the General Hospital are among the prominent structures of the year. Fortunately labor troubles of a serious character did not interfere with operations, which were carried on to an unusually late period owing to the open season. The buildings include 2,120 houses, 108 stores, 42 factories, 6 churches, 91 stables, 205 sheds, 20 warehouses, 11 schools, 5 hotels, 2 theatres and 2 office buildings.

According to the civic building department, the following is the number of permits issued and the value of the buildings in 1911:

	New Buildings	Permits	Alterations	Permits
January	$ 330,365	58	$ 35,475	18
February	572,740	86	69,688	54
March	933,014	160	168,563	87
April	1,588,840	286	123,131	140
May	1,424,895	429	278,245	160
June	1,550,365	323	230,495	100
July	914,979	251	142,782	78
August	1,808,715	295	89,042	79
September	1,058,016	274	99,860	72
October	1,307,850	330	352,105	66
November	825,230	225	52,815	43
December	590,755	94	31,667	28
	$12,905,754	2,811	$1,673,868	925

This gives a total of 3,736 permits of a value of $14,759,632.

These figures by no means represent the true value of the year's building list. It is recognized that, owing to the unsatisfactory building laws, work is often undervalued, and besides this two wards of the city, Longue Pointe and Cote des Neiges, issue no permits. Further, outside municipalities, which in reality form a portion of Greater Montreal, issue their own permits, which consequently do not come into the city's total. For instance, Westmount last year, that is up to October 31, issued permits for $1,334,071 as against $1,947,670 in the previous year. There is also another factor to be considered: the city's own work is not included in the total, neither is the work done for the Harbor Commissioners. Thus, there is left out of account $30,000 for Cote des Neiges, $100,000 for Longue Pointe, $500,000 for the city, and $1,500,000 for the Harbor Commissioners—a total of $2,130,000, in addition to the work done in the outside districts. Probably somewhere in the neighborhood of 40 per cent. ought to be added to the total of the civic permits in order to provide for the under-estimates and for work for which no permits are required. Mr. Lauer, the Secretary of the Builders' Exchange, estimates the real total for Montreal to be about $25,820,000.

As compared with 1910, the building permits show a decline of $956,227 in value but it must not be overlooked that permits for nearly four millions' worth of work constructed in 1911 were included in the total of 1910, the year when the necessary authority was obtained.

Indications point to a very active 1912 in the building trade of the city. Many properties, especially in the downtown shopping districts, have been purchased with a view to the erection of office buildings, hotels, and other big structures. A large number of important apartment houses are projected, and as the population continues to increase and the suburbs are being developed, there is certain to be a heavy addition to the smaller houses and flats. Then, too, many sites have been purchased for factories, and if the industrial expansion continues, it may be safely said that other properties will be secured for this purpose. Among the larger buildings for which arrangements are being made are the Mount Royal and Ritz-Carlton Hotels, new buildings for the Royal Trust and Bank of British North America, a ten-storey office on McGill street, two small theatres, and two or three churches. The Place Viger Hotel of the C. P. R. is also to be partially reconstructed.

Annual Meeting Winnipeg Builders' Exchange

The Winnipeg Builders' Exchange's annual general meeting was held on the evening of Wednesday, December 28, and was well attended.

The particular business dealt with was the annual report of the auditors, Messrs. Stirling and Rankin, the election of a president, vice-president and treasurer for the year just commenced, also four members to the board of directors, to replace those who were retiring in due rotation. Various other matters of importance were discussed and disposed of.

The annual report and statements regarding the finances and progress of the Exchange were read and accepted.

The following officers were elected:

President, W. J. Davidson, contractor, (elected unanimously); 1st vice-president, Fred Hinds, general contractor; 2nd vice-president, John MacQuarrie, general contractor; treasurer, T. D. Robinson (re-elected unanimously), President of T. D. Robinson & Sons. Directors: W. H. Carter (re-elected) of Carter-Halls-Aldinger Co., general contractors; Geo. W. Murray, president of G. W. Murray Co., Ltd., (re-elected); Jos. Bourgeault, president of the Western Stone Co., (re-elected); Robert Watson, general contractor.

The retiring president, Mr. F. H. Davidson, in vacating the chair, thanked the members most heartily for the support given him during the past year, and declared that he would continue at all times to have the affairs of the Exchange at heart. He particularly thanked the directors for their co-operation and support during his term of office, and had much pleasure in extending the hand of welcome and congratulation to his successor, for whom he wished every success. The retiring president has just been elected to represent Ward 4, in the City Council.

Mr. W. J. Davidson, the newly-elected president, upon taking the chair, regretted very much that Alderman Davidson had declined a continuance of office for another year. He felt the great honor done him in electing him president of one of the largest builders' exchanges on the continent, and promised to do all in his power to further the interests of the members and the association.

According to the report of the Montreal Fire Commissioners, the fires reported for last year were 2,075, as compared with 1,666 in the previous year. The Commissioners suggest that powers should be sought to enable them to find out the amount of losses caused by fire.

Canadian City Engineers

R. D. Brown, A. M. Inst. C. E., St. Catharines, Ont.

Mr. Robert Dunlop Brown, A.M. Inst. C. E, who was recently appointed City Engineer of St. Catharines, Ont., received his early training in the Borough Engineer's office at Clydebank, Scotland. He was fortunate to start in a place which for rate of growth exceeds all towns in the Old Country, and even outstrips some of our Canadian cities. During the past thirty years Clydebank has grown from the bare fields to a population of 44,000, and much of the work incidental to that growth came under Mr. Brown's care. In his time the Engineer's staff numbered three (there are now thirteen) and naturally a goodly share of the work fell on Mr. Brown's shoulders. He was particularly associated with a town planning scheme, the new garbage incinerator, street paving and widening work, and the new water scheme (Parliamentary work).

After four years in Clydebank, Mr. Brown spent seven years as assistant to the City Engineer of Glasgow, and was employed under Mr. W. C. Easton, B.Sc., M. Inst. C. E., Engineer on Construction for the Glasgow Main Drainage Works for the purification of the River Clyde. These works, which took about ten years to complete, and cost a colossal sum of money, involved almost every phase of engineering, and Mr. Brown was engaged upon such works as tunnels in compressed air with shields, pumping stations, deep foundation work in quicksand, purification works, etc. One of Mr. Brown's most cherished possessions is a testimonial on this work given him by Sir A. M. Shaw, LL.D., the civic chief of Glasgow.

City Engineer Brown, of St. Catharines, Ont.

Leaving corporation service to take up an appointment with the Considere Construction Company, Ltd., of Westminster, Mr. Brown spent a year on reinforced concrete work and was responsible for the Dunblane bridge (105 feet span over the Allan water) and a steamboat wharf on an exposed part of the coast. On the completion of these contracts he came to Canada, and after a few months under the City Engineer of Toronto on flood relief problems, received his present appointment to St. Catharines.

In addition to his connection with the Institution of Civil Engineers, Mr. Brown is also an Associate Member of the Institution of Municipal Engineers (London, Eng.), the Geological Society and the Sanitary Association of Scotland. He served two years as member of council of the Glasgow Association of Civil Engineers.

Acting for the Hill interest, a party of English capitalists have just closed a deal whereby the Great Northern Railway secures 900 acres of land at Port Arthur. It is stated on reliable authority that the land is to be used for the terminals of the Hill lines when they are carried into Port Arthur, and that the Canadian shops of the Hill lines will be built there, costing several million dollars. The land purchased extends along the boundary of the two cities, the great bulk of it being within the limits of Port Arthur, and the balance of it in the Township of McIntyre. In the past few days several Great Northern officials have been in the city looking over the site, and the announcement was made that the route for a line from Port Arthur to Winnipeg had already been selected. Work on this will start as soon as the plans fully mature.

The Long Sault Rapids Project

An informal meeting of the newly-appointed Canadian section of the International High Joint Commission was held in Montreal last week, preparatory to the convening of the body in Washington on January 10. The new Commission, the Canadian members of which are Messrs. T. chase Cargrain, K.C., of Montreal; C. A. Magrath, of Medicine Hat; and H. A. Powell, of St. John, N.B., has been formed under the terms of the general treaty between Great Britain and the United States made two years ago. One of the greatest problems which the international commissioners will face will be the project of damming the Long Sault Rapids. The Long Sault Development Company, of which the Pittsburg Aluminum Company is the principal factor, now have a bill before the United States Senate asking for the necessary authorization to carry out the proposed work of building a huge dam, which is to harness the power of the greatest of the St. Lawrence rapids. There has, however, been strong opposition to the scheme at Washington, and a determined effort will be made by the opponents of the measure to have the matter referred to the new International Commission.

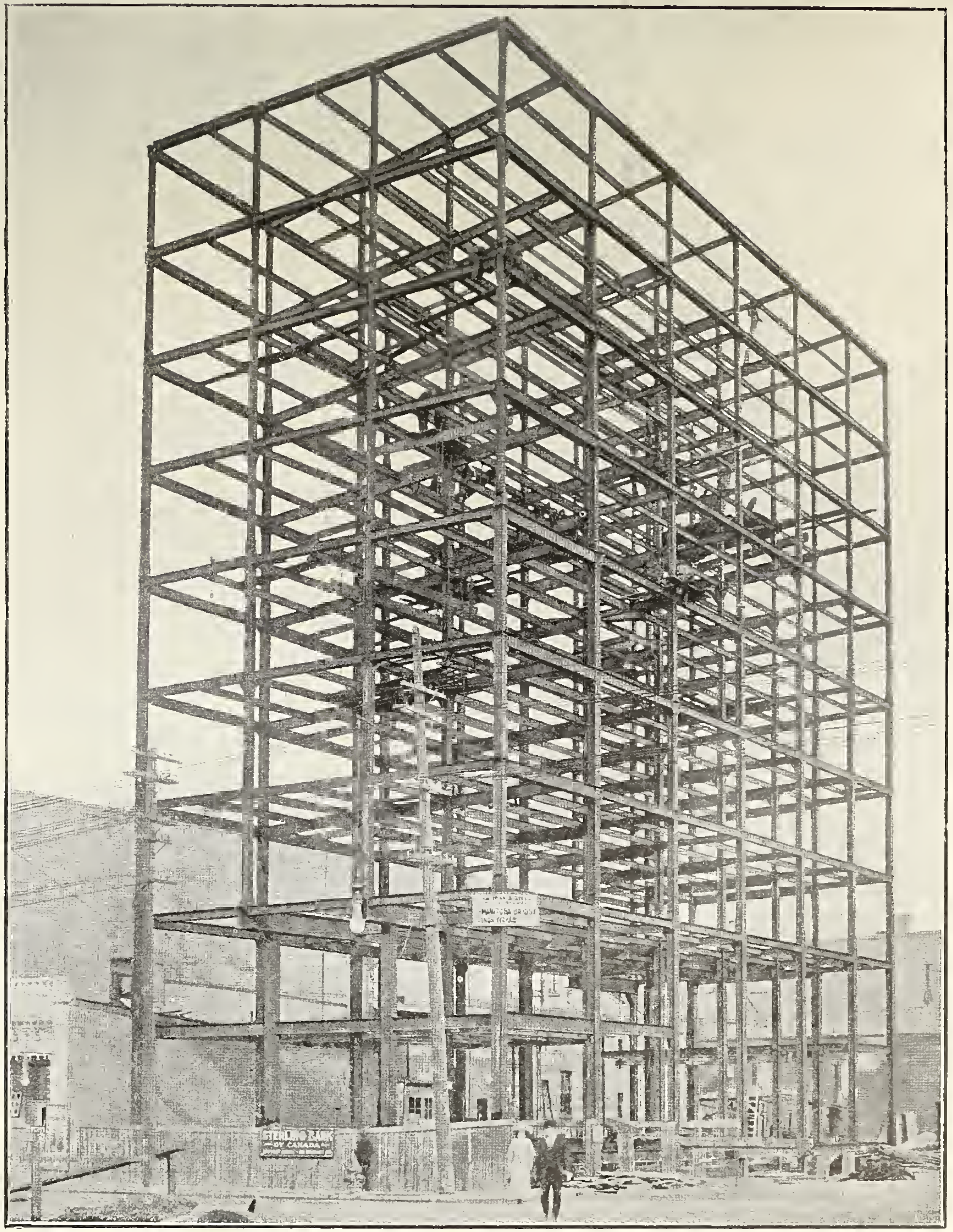
The Randolph, MacDonald Company, Limited, Crown Life Building, Toronto, carried out during 1911 work totalling in value $270,000. They are now engaged upon improvements to the entrance at Locks 22 and 28 of the St. Lawrence Canal, section No. 7 of the Trent Canal and the Rosedale section of the Trent Canal. The superintendents in charge of the above construction are, respectively, Messrs. W. T. Stone, E. L. Knight, A. Stephen, C.E., and A. Gillard. The work on Locks 22 and 28 includes crib building and sinking, dredging and concrete walls; that on section No. 7 of the Trent Canal includes dredging, submarine drilling and blasting, completion of concrete locks and construction of dam; the Rosedale section comprises dredging and the general completion of the work. The firm anticipates an active season during 1912.

The twenty-sixth annual convention of the Canadian Society of Civil Engineers will be held at Montreal, January 24-26 next. Mr. C. H. Rust, City Engineer of Toronto, is president of the society and Prof. C. H. McLeod, 413 Dorchester street, W., Montreal, is secretary. Further particulars of the meeting will be announced later in these columns.

A Busy Winnipeg Firm

One of the busiest firms in the West is the Manitoba Bridge & Iron Works, Limited, of which Mr. T. R. Deacon, C.E., M.E., is president and general manager, and Hugh B. Lyall, secretary-treasurer. The work carried out by this firm is of a very general character. The plant comprises a grey iron factory, machine, forge and plate shops, in addition to a bridge and structural department. The last named is the largest in volume of business and is the only shop doing bridge work west of Sault Ste. Marie. During the past year the Manitoba Bridge & Iron Works have completed several large structures, including the locomotive plant for the N. T. R. Commission, involving something like 5,000 tons; the ten-storey Sterling Bank Building; the new Bank of Commerce; the new Bank of Montreal and the Eastern Townships Bank, all in Winnipeg. In addition, several large structures at Calgary, Regina, Edmonton and Saskatoon went through the company's shops, while at Lethbridge, Alta., and Cranbrook, B. C., they erected for the C. P. R. bridges totalling 1,000 tons. At present they have the contract for the car shops for the N. T. R. Commission and numerous bridges for the different railways. The employees at the plant number about four hundred.

Mr. T. R. Deacon, General Manager Manitoba Bridge and Iron Works, Limited.



The 10-storey Sterling Bank Building at Winning, one of the Manitoba Bridge and Iron Works' recent contracts.

Canadian Consulting Engineers

H. M. Burwell, C.E., Vancouver

Mr. H. M. Burwell, C.E., of Vancouver, one of the foremost consulting engineers of Western Canada, is well known to many readers of the Contract Record and Engineering Review.

The birthplace of Mr. Burwell is Port Talbot, on Lake Erie, and he is a year or two on the fortunate side of fifty.

Mr. H. M. Burwell, C.E., Vancouver

At the outset of his career he served as an articled pupil on Dominion Government surveys in the Northwest Territories. Subsequently he obtained an appointment on a government expedition to the Hudson Straits. In 1886 he qualified as an Ontario Provincial and Dominion Land Surveyor.

A day in the life of H. M. Burwell, C.E.—Return journey from Seymour Creek

From 1887 until 1902 he was engaged in private practice in British Columbia as a surveyor. In the latter year he became identified with an important undertaking as engineer in charge of the construction of the Vancouver Power Company's hydro-electric development at Lake Buntzen. From 1906 until 1911 he was engaged as consulting engineer on the extensions to the Vancouver waterworks. A comprehensive and valuable paper on the latter undertaking was read before the general section of the Canadian Society of Civil Engineers in December, 1910, and was reproduced in the Contract Record for December 28th, 1910.

Mr. Burwell's connection with various important enterprises in Western Canada is well known but it is of interest to recall the design and construction of the large concrete dam at Lake Buntzen; the Coquitlam Lake timber crib dam; the installation of pipe lines at Lake Buntzen; the construction of a power house at Lake Buntzen for four units of 3,000 h.p. each; the construction of the westerly half of the Coquitlam tunnel, 9 ft. x 9 ft., having a total length of two and one-half miles; the extension to the Capilano water system; the Seymour Creek waterworks system, having a capacity of 9,000,000 Imperial gallons a day; the Little Mountain reservoir with a capacity of 25,000,000 Imperial gallons, etc.

The cost of Vancouver's additional water supply obtained from Seymour Creek was $575,000. The undertaking was a most successful one in every particular and reflects the greatest credit upon its engineer, Mr. Burwell.

We are indebted to our Vancouver correspondent for the accompanying photograph which shows Mr. Burwell on a return trip from Seymour Creek and incidentally furnishes an insight into the methods of transportation adopted by the engineer in that section of the country.

Winnipeg's building permits for 1911 totalled $17,584,000 compared with $15,116,450 for 1910. Building Inspector Rodgers is optimistic concerning 1912. An aggregate of $20,000,000 is predicted.

A remarkable building increase is shown at Calgary, Alta., whose permits for 1911 totalled $12,909,478 against $5,589,594 for 1910. The City Engineer's Department at Calgary was exceptionally busy. Among the work carried out under the supervision of City Engineer Child were the following items: 33 miles of sewers, 38 miles of water main, 12 miles of paving and 20 miles of sidewalk. During the year the capacity of the electric plant was more than doubled.

The Allis-Chalmers Company, of Milwaukee, is undergoing re-organization. It is understood that new capital, amounting to $5,000,000 has been provided. The shops at Milwaukee, Chicago and Cincinnati are running as usual and the operations of the company will not be curtailed. This concern is entirely distinct from Messrs. Allis-Chalmers-Bullock, Limited, of Montreal, who are in no way affected by the proceedings of the American company. The Montreal concern has experienced none of the adverse conditions felt in the United States. On the contrary its shops are full of work and running on their regular time.

A belated report just issued shows that in 1910 Montreal spent $3,462,263 on the road department. Of this $850,390 went in permanent pavement works, 11.4 miles of new paving having been laid. The following was laid: asphalt, 71,081 square yards; granite, 49,327 square yards; scoria, 135,990 square yards—a total of 264,011. The average cost comes out as under:—

	1909	1910
Asphalt, by contract	$2.26	$2.14
Scoria blocks	3.80	3.67
Granite blocks	3.69	3.52

Just over 48 miles of sidewalks were constructed at a cost of $452,931.

Residence of D. B. Hanna, Esq., on Castle Frank Avenue, Toronto.—Messrs. T. Cannon & Son, Ltd., Contractors.

A Quarter of a Century's Progress with a Toronto Firm

The contracts carried out by Messrs. T. Cannon & Son, Limited, Toronto, last year, included some exceptionally interesting pieces of work. We reproduce herewith photographs of the residence of D. B. Hanna, Esq., Castle Frank Ave., Toronto; the new chapel building at Wycliffe College, Toronto, and the Canadian Bank of Commerce at Kingston, Ont. The entire two street fronts of the last named building are executed in terra cotta, furnished by the Northwestern Terra Cotta Company, of Chicago. Among other contracts completed by the firm last season may be mentioned the Dominion Bank, at the corner of St. Clair avenue and Vaughan Road, Toronto, and the improvements at the York Club, Toronto. They also installed a battery of seven Lancashire boilers at the soap works of Messrs. Lever Bros. Each of these boilers was 32 ft. long and 8 ft. in diameter. Extensive alterations to other buildings at the Sunlight Soap Works were also made by Messrs. Cannon & Son. Among their customers for smaller work were such well-known names as Messrs. E. B. Osler, Cawthra Mulock, J. H. Plummer and the Toronto Insurance Vessel Agency. The work upon which the firm is now engaged includes the book vaults for the Canadian Bank of Commerce at Atlantic avenue, Toronto.

The attention of this firm is devoted almost exclusively to masonry work. During the quarter of a century that they have been identified with the contracting field in Toronto they have erected some of the best known buildings in the Queen City. The superintendence of the construction work is in charge of Mr. T. Cannon, Sr., and the firm's office and yard is at 75 Brock avenue. They have their own railway siding on the C. P. R. and also have every facility for handling important building contracts.

Canadian Bank of Commerce, Kingston, Ont.—Messrs. T. Cannon & Son, Ltd., Contractors.

Wycliffe College Chapel, Toronto, erected by Messrs. T. Cannon & Son, Ltd.

Builders of the Commercial Metropolis

A Splendid Example of the Advantages of Organzation—The Work and Progress of the Montreal Builders' Exchange

It will scarcely occasion jealousy among other associations of its kind if we say that no other organization in the Canadian building field has made such notable progress as the Montreal Builders' Exchange, and that no other exchange has exerted such a wide and constructive influence in the community. The Montreal Builders' Exchange was organized some fifteen years ago and incorporated two years later. The association met with indifferent success until 1905 when things were at such a low ebb that a permanent secretary, in the person of Mr. J. H. Lauer, was appointed. Mr. Lauer is well known to the majority of our readers and it is a sufficient tribute to his executive ability and energy to mention the fact that the Exchange to-day, with its membership of between 300 and 400 is one of the largest and most influential on the continent.

Mr. James Ballant yne,
President MontrealBuilders' Exchange.

Mr. J. H. Lauer,
Secretary of the Montreal Builders' Exchange, also of Canadian National Association of Builders.

Mr. W. E. Ramsay,
Vice-President Montreal Builders' Exchange.

In order that each department of the contracting business shall have proper representation in the association the Exchange is divided into trade sections which meet at least once a month and discuss topics of trade interest. The various sections are as follows: (1) general contractors, masons and bricklayers; (2) carpenter contractors; (3) master plumbers; (4) electrical contractors; (5) master plasterers; (6) master painters; (7) lumbermen; (8) supply dealers; (9) marble and tile contractors; (10) roofing and sheet metal contractors.

Each of these trades elects its own executive officers and each section is represented on the Board by a director. Matters of interest to the whole Exchange are discussed at regular general meetings.

Recognizing the value of developing the social element, the Montreal Exchange makes adequate preparations for the entertainment and diversion of its members. During the summer a number of excursions are held. The annual banquets of this association in the winter have become notable on account of their representative attendance and the prominent public men who have spoken at these functions. A new and successful departure has been made by holding noon-day luncheons every fortnight, when business talks on subjects of interests to the trade are given by prominent men.

The Exchange quarters are situated in the new Eastern Townships Bank and offer every facility in the way of writing and reading rooms, consulting and committee rooms, telephones, stenographic assistance, etc.

A large hall for permanent exhibits of building materials is maintained by the Exchange. Plans of all government works are filed for reference and a library of trade catalogues is being established so that ready information map be obtained in regard to building appliances and materials.

In regard to the attitude of the Montreal Builders' Exchange upon public questions, it endeavors to watch all legislation, whether Federal or Provincial, affecting the interests of contractors. Doubtless many will recall the active interest taken by the Exchange in the drawing up of the Quebec Act for Compensation to Workmen for Accidents, which became effective in January, 1910. The Exchange works hard to reduce to a minimum the possibility of labor disputes. Again it will be within the recollection of some how the association, endorsed later by the Canadian National Association of Bulders, sent several delegates to Ottawa to induce the late government to extend the scope of the Industrial Disputes Investigation Act to the building trades. At present it is limited to public utilities. So far, the Montreal delegates have not received the consideration they expected, this being attributable largely to the strong influence exerted by the unions. It is intended to bring the matter forward at the C. N. A. B. Convention in Toronto next February.

The Exchange has also urged upon the Federal authorities the desirability of co-ordinating the various provincial acts regarding compensation to workmen, which now vary in every province of the country.

Another progressive move made by the association was to take up with the late government the protection of the stone and quarry interests. It is of interest to note that a memorial affecting this matter will be presented to the new government this year.

Strenuous efforts are being made to obtain a uniform contract in the Province of Quebec. The present variations are the cause of constant friction with the architects and it is hoped that a successful issue will be arrived at in the near future.

Much more could be said concerning the Montreal Builders' Exchange, its excellent organization, its work and its aims, but enough has been said to show what may be accomplished where energy, determination and progressiveness are brought into play. What this Exchange has accomplished in six or seven years should be an object lesson to other associations. And it is refreshing to note that with all the achievement of the Montreal Builders' Exchange, its first and most important object has been to impress upon its members the dignity of their calling, to raise their ideals, to improve the ethics of the business and give it a more professional status.

Mr. Joseph Brunet,
Vice-President Montreal Builders' Exchange.

The president of the Exchange is Mr. James Ballantyne, a well-known sanitary and heating engineer, who conducts one of the largest businesses in this line in Montreal and Winnipeg. The vice-presidents are Mr. Joseph Brunet and Mr. W. E. Ramsay. The former is president and managing director of the Laurentian Granite Company, Limited, of Montreal, and the latter is Montreal manager for the Pedlar People, Limited, of Oshawa. Mr. Ramsay is the representative director on the Board of the National Association of Builders' Exchanges. The remainder of the directorate is comprised of the following gentlemen: Mr. J. P. Anglin, (General Contractors); Mr. Alex. Bremner, (Builders' Supplies); Mr. W. T. Castle, (Master Painters); Mr. K. D. Church, (Cement and Concrete); Mr. Thomas Gilday, (Master Roofers); Mr. T. A. Morrison, (Brick and Quarry Supplies); Mr. Frank Pauze, (Master Carpenters); Mr. John Quinlan, (Masonry and Cut Stone); Mr. Wm. Rutherford, (Lumber and Mill Work); Mr. E. W. Sayer, (Electrical Contractors); Mr. J. E. Walsh, (Master Plumbers); Mr. J. H. Lauer, (Secretary-treasurer).

Personal News and Notes

Mr. A. J. Latornell, City Engineer of Edmonton, Alta., has resigned.

The building permits issued at London, Ont., during 1911 established a new record for the city. The total was $1,036,880.

Mr. J. P. Hynes, of Toronto, is mentioned for the vacancy on the Ottawa Improvement Commission caused by the resignation of Senator Frost.

The name of Mr. J. T. Child, City Engineer of Calgary, is mentioned in connection with the vacancy at Moose Jaw. The salary offering is $5,000 a year.

Mr. F. A. Yerbury of the Canadian Boving Company, Limited, is leaving Toronto to accept a position with the Heaps Engineering Company, Limited, Vancouver.

Mr. W. Robb, the retiring city treasurer of Montreal, was recently presented with a grandfather clock by the civic officials. The presentation was made by Mayor Guerin.

During 1911, the city of Victoria, B.C., nearly doubled the building total established for 1910, the figures being respectively $4,018,415 and $2,273,045. The 1909 total was $1,673,420.

Wrights, Limited, Toronto, has been incorporated by Messrs. C. F. Wright, James Barr and W. B. Chamberlain, all of Toronto, with a capital of $200,000, to carry on a land and building business.

Mr. Adolphe Butze, General Purchasing Agent of the Grand Trunk Railway, Montreal, has retired on pension and Mr. J. H. Guess, Assistant Purchasing Agent, has been promoted to the position.

Messrs. Thomas J. Smyth, Frank Ryan and H. J. Welch, all of Toronto, have secured a charter for York Sand & Gravel, Limited, East Toronto, Ont. The capital of the new company is $200,000.

A good record is shown by the municipality of Point Grey, B.C., a suburb of Vancouver. During the last seven months, the period in which records have been kept, the total building has amounted to $1,529,750.

Owing to the dissolution of the old Quebec Bridge Company and the assumption of its obligations by the Dominion Government, the city of Quebec will obtain a refund of $300,000, the amount subscribed towards the construction of the ill-fated Quebec bridge.

Among the new western incorporations may be mentioned Grant Smith & Co., Vancouver, B.C., incorporated with a capital of $100,000, to build wharves, piers, docks, etc. Among the directors are Messrs. Grant, Smith, Angus McDonnell and J. Sims, all of Vancouver.

Among the speakers arranged for at the noon-day talks of the Builders' Exchange, Montreal, are Mr. G. W. Stephens, president of the Montreal Harbor Commissioners, and Mayor Hopewell, of Ottawa. Some prominent members of the U. S. building trade are also being asked to speak.

The General Equipment Company, Limited, of Montreal, has obtained a charter with a capital of $50,000 to carry on business as contractors, dealers in machinery, building supplies, etc. The incorporators are Messrs. T. B. Gould, O. B. McCallum and A. A. McGee, all of Montreal.

The Lehigh Portland Cement Company of Chicago were the successful tenderers for the supply of 25,000 barrels of cement to the city of Winnipeg for use during 1912. The net price to the city is 60c. per 100 lbs. net weight,—a saving of 14c. a barrel of 350 lbs. on the price paid for 1911.

The Peerless Brick Co., Ottawa, contending that clay is a mineral, demands $40,000 from the C. N. R., which wants to expropriate for a right-of-way certain lands which the company claims come within the scope of the act preventing expropriation which might obstruct the workings of a mine.

The addition of fourteen storeys is being made to the C.P.R. hotel at Banff Springs, two hundred men are working in day and night shifts in order to complete the work by the opening of the next tourist season. The addition will be of brick and concrete, and will make the hotel the highest building in the Rockies.

The remains of the late Mr. Kenneth J. Kingston, who was killed by a rifle bullet on a survey in Saskatchewan, were interred at Ottawa recently. The funeral was attended by many prominent government officials, including Hon. F. D. Monk, Minister of Public Works, and Mr. J. B. Hunter, Deputy Minister of Public Works.

Mr. P. Lyall, of Montreal, has withdrawn from the arrangement by which he was to have underwritten the bonds of the Mount Royal Hotel Company, which proposes to build a ten-storey hotel on St. Catherine street west, Montreal. It is reported that negotiations are proceeding for a new general contract for the construction of the hotel.

The Maritime Dredging & Construction Company has been granted incorporation with a capital of $100,000 and head office in St. John, N.B. The company will carry on a general dredging and construction business. The incorporators are Messrs. M. W. Doherty, G. H. Dean, Robert Seely, Thomas Bell and Frederick C. MacNeill, all of St. John.

The season's greetings from the Dominion Bridge Company, Limited, Winnipeg, Man. (also of Montreal and Toronto), were expressed in an artistic calendar bearing the following quotation from Robert Louis Stevenson:—"So long as we love, we serve; so long as we are loved by others I would almost say that we are indispensable; and no man is useless while he has a friend."

The value of buildings erected at Welland, Ont, during 1911 was as follows: public and business, $213,878; residences, $128,930. If the factories and residences erected in the suburb (Welland South) were added, the total would exceed $1,000,000. During last year an unsuccessful effort was made to extend Welland Boundary to take in Welland South. Mr. D. T. Black is Town Engineer and Building Inspector.

The Neptune Meter Company, 90 West street, New York, have sent us an interesting souvenir for the year in the shape of a gilt-edged leather pocket diary containing maps and memoranda and incidentally some valuable tables and a variety of useful trade information. We also received from the Neptune Meter Company a card of particularly neat design, worded as follows:—"Here's that a full and steady stream of prosperity under high pressure may flow your way unmetered during 1912!"

Canadian Credit Men's Association

The Ontario branch of the Canadian Credit Men's Association held a meeting at McConkey's restaurant on King street, Toronto, on the evening of January 4th, when the following Board of Governors were appointed:

A. G. Malcolm, of Gordon MacKay Company; H. E. Eby, of Eby, Blain & Co.; W. H. Lamont, of H. S. Howland & Sons; J. A. Catto, of W. R. Brock & Co.; L. F. Moneypenny, of Moneypenny Bros.; J. W. Lawrence, of W. R. Johnston & Co.; A. G. Parker, of W. J. Gage & Co.; D. C. Haig, of E. & S. Curry, Limited; J. A. McLaren, of Taylor & Dallas, Limited; H. R. Flett, of Taylor-Forbes Co.; G. C. Scott, of International Varnish Co.; A. R. Clark, of A. R. Clark & Co.

The chief speaker at the meeting was W. D. McPherson, M.P.P., and his subject was the "Bulk Sales Act," which he proposes introducing to the legislature at the next session. He says that he has been informed by the Attorney-General that the government will give it their favorable consideration. There are 97 members in the Ontario branch at present.

Awards in Competition at Windsor, Ont.

Mr. Alexander Black, Secretary of the Board of Education at Windsor, Ont., informs us that nineteen plans and specifications were received by the Board following an advertisement in the Contract Record. The plans were submitted to Mr. W. J. Malcolmson, of Detroit, who acted in an advisory capacity to the property committee. In the result, the first prize was awarded to "Rex" (Gilbert Jacques & Company, Windsor, Ont.), and "Roman Doric" (J. L. Wilson & Son, Chatham).

Plans for Provincial Parliament Buildings at Winnipeg

Five of six Toronto architects have intimated their desire to enter the competition for the prizes offered by the Government of Manitoba for the best five plans for new legislative buildings to be erected in Winnipeg. Mr. James H. Hartney, agent for the Province in Toronto, has also had inquiries from architects in the United States, who, however, are not eligible, as the conditions state that all competitors must be resident within the British Empire. All drawings by competitors must be sent to Winnipeg on or before February 15.

Toronto Filtration Plant in Operation

The city of Toronto's new filtration plant was put into operation last week. The eight filtration beds which are in operation at the plant are removing from 75 to 90 per cent. of the bacteria in the water which passes through them. They are gradually increasing in efficiency, and some of the beds which have been longest in commission are showing even better results. It is expected that 95 per cent. of the bacteria will easily be removed when the whole plant is in efficient operation.

Glass Paving Blocks in France

Investigations have been made in response to inquiries regarding the supposed use in Lyon of glass bricks or blocks for pavements.

Seven or eight years ago a plant was established at La Demi Lune, a suburb about four miles from Lyon, for making glass paving material under the name of "pierre de verre Garchey." After many experiments carried out at the factory the manufacturer applied to the Lyon municipality for the right to make a trial on one of the chief thoroughfares. The necessary authorization was granted, provided that the inventor would bear the entire expense of the undertaking. The place chosen for laying the glass pavement was a section of the Place de la Republique, where traffic of cabs, automobiles, and wagons of all kinds is very heavy. The glass bricks remained in place for less than two years, and were then taken out, as they were in very poor condition. The edges were all broken, and in many cases the blocks were split through and through. The opinion of officials at that time was to the effect that this glass pavement could be used under favorable circumstances for sidewalks, but not for the middle of streets.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Barrie, Ont.

The by-law to raise $35,000 for sewers carried. Mayor, Alex. Cowan.

Berlin, Ont.

By-law has been carried to raise $100,000 for extension of waterworks; 1,000,000 gal. concrete reservoir, new water tower; 2,000 feet 10-in. mains, and additional mains and pumps.

Chatham, Ont.

Complete data will be obtained by council re cost of equipping paving plant. It is likely that one will be built next year.

The council contemplates laying bitulithic pavement on St. George street early in the year.

Clinton, Ont.

The by-law for good roads was carried by 123 majority. Mayor, B. J. Gibbings.

Hamilton, Ont.

Surveys will be made for roads, water mains and sewers, $30,000, near Burlington, for W. D. Flatt, real estate agent, Federal Life Building, Hamilton, Ont. Address, H. Davies, manager.

By-law carried for waterworks extension. Intake, crib, 2,000 feet of 48-in. pipe, gate house, gate, extension 20-in. intake, $60,000; pump house, two pumping units, each one million gal. capacity; two heavy pressure pumping units, one million each; force main to tank 2,500 feet 12-in. pipe; elevated tank 100,000 gal. capacity, $67,000. Beach pumping plant, two six-million gal. pumps; extension pumping station and foundation for machinery; reconstruction pump wells and connections, $70,000. 36-in. force main from Beach to city, shorter mains connecting, $296,000. Sub-mains 9,800 feet, various sizes of pipe, $42,000. Additional mains to be laid later, various sizes of pipe, to amount of 19,000 feet, $73,000. New 33-in. conduit connecting filtering basin and wells at each $30,000. It is proposed to build a new reservoir at a cost of $120,000 and install two thousand sets of meters to cost $27,000. City Engineer, A. F. Macallum.

Ingersoll, Ont.

Ratepayers voted $125,000 for purchase of waterworks system. Mayor, Dr. Coleridge.

Montreal, Que.

City is contemplating an addition to sewage farm, Back River, to cost $50,000. City Engineer, G. Janin.

North Toronto, Ont.

The town approved of the project to bring water supply from Lemonville. Engineer, E. A. James.

Ottawa, Ont.

The ratepayers voted down proposed expenditure of $2,300,000 to bring water from McGregor's Lake. John Henderson, city clerk.

Sarnia, Ont.

Town of Sarnia, Mayor McGibbin, is planning a new waterworks system, the new supply to be taken from Lake Huron near Point Edward.

St. Maurice, Que.

St. Maurice Hydraulic Co. are contemplating the construction of storage and regulating dams of reinforced concrete. No plans ready yet.

Toronto, Ont.

Victoria street will probably be extended from Gerrard to Carlton streets. By-law to be passed by council one month from date. Plans, etc., at City Hall. City Clerk, W. A. Littlejohn.

Following works planned: Grading, $3,603; tile pipe sewers, $15,835; pavements, brick block, $16,648; concrete $10,320; medium asphalt, $23,590; roadways, $9,294; concrete sidewalks.

Victoria, B. C.

The legislature will be asked at its next session for over $7,000,000 for new roads and improvements throughout the province. Minister of Public Works, Hon. Thomas Taylor.

Welland, Ont.

Work will commence shortly on road making, cost $75,000. County Council at its January session will call for tenders if Government has approved of plans. Specifications at office of County Clerk, R. Cooper. Engineer, W. J. Bowman, C. E., Berlin.

It is proposed to pave east and west Main and Muir streets; three miles in all. Tenders called in June, 1911, asphalt block, vitrified brick, taralithic and bitulithic with brick between car tracks were specified, work was laid over till spring. It is almost certain that work will go ahead as all the members of council are in favor. D. T. Black, engineer.

CONTRACTS AWARDED

Cartierville, Que.

Contract is awarded for construction of sewers, cost $3,000. Municipal Engineer, F. C. Laberge, 30 St. James street, Montreal. Contractor, Placide Laframboise, Boulevard St. Paul, 1,200 feet of 9-in. clay pipe.

Longue Pointe, Que.

Messrs. John McDougall (Caledonian) Iron Works Co., Ltd., have been awarded the contract for constructing a filtration plant at the Asylum here.

Victoria, B. C.

The Westholme Lumber Company, according to terms of contract, will use reinforced concrete pipe (Sooke Lake water supply) from the Lake to Humpback reservoir and rivetted steel pipe to the city. Contract price, $1,169,720.

Railways, Bridges and Wharves

London, Ont.

By-law carried by large majority for new bridge between West and South London. Council will consider project at once. City Engineer, Geo. W. Wright.

Montreal, Que.

Application is being made to Legislature for Act permitting construction of railway through Counties of Joliette and L'Assumption connecting with National Transcontinental Railway and the building of a tunnel to bring railway into Montreal.

North Vancouver, B. C.

Minister of Railways, Victoria, has approved of map showing general location of proposed Grouse Mountain Scenic Incline Railway from North Vancouver to Grouse Mountain.

St. Catharines, Ont.

Ratepapers voted in favor of King street route for bridge over old Welland Canal. A second by-law to authorize expenditure of $150,000 for bridge via King street route will be submitted. Mayor, Dr. W. H. Merritt.

St. John, N. B.

It is understood that final arrangements have been made by the Dominion Government with Norton-Griffiths Contracting Company for the development work in dredging and wharf building at Courtenay Bay. Work to commence next spring and to finish in five years. Cost $9,000,000.

Toronto, Ont.

Tenders are called for supplying and driving of timber sheet piling at sewage disposal works site. Plans, etc., at Main Drainage Dept., and at office of City Engineer. Received by Chairman until noon, January 16th. Chairman Board of Control, G. R. Geary.

Following the recent decision of the Dominion Railway Board granting the right of way into the city of the Canadian Northern and the Toronto, Niagara & Western Railways, which entail the construction of 56 ft. subways. Plans for subways at Dovercourt road, Erie ave. and Dufferin street at a cost of $200,000. Eventually 32 subways will be built at an outlay of $1,280,000.

Winnipeg, Man.

It is proposed to move superstructure of Osborne street bridge on the Assinaboine to Arlington street. No funds are available at present. Plans to be prepared by engineers. Controller Harvey.

CONTRACTS AWARDED

Vancouver, B. C.

Wharf, cost $70,000, Carrall street, for Union S. S. Co., Carrall street. Manager, E. H. Beazley. Contractor, British North America Construction Company, Bank of Ottawa Building, $70,000. It is stated work will begin shortly.

Public Buildings, Churches, Schools, etc.

Brandon, Man.
The Masonic Lodges have secured site of 175 x 125 feet, corner of Eighth and Lorne ave., for the erection of a Masonic Hall.

Brantford, Ont.
Tenders are called for school, cost $45,000, Chestnut ave. Two storeys and basement, 84 x 112, ten rooms, brick with reinforced concrete floors, concrete foundation, steam heating, electric lighting, slate roofing, interior finish hard maple trim, black ash, ventilating fan, stand pipes, telephone, two dynamos (1½ h.p. and 5 h.p.), modern plumbing. Received after January 1st until noon, January 27th by secretary. Board of Education; Secretary, A. K. Bunnell. Architects, Taylor & Taylor, Brantford.

Burlington, Ont.
A by-law carried for school, cost $35,000, for Public School Board. Architect, Mills & Hutton, Bank of Hamilton Bldg., Hamilton. Two storeys, brick and stone, stone foundation, electric lighting, tar and gravel roofing, steam heating, ventilating system, electric bells, hardwood interior finish. By-law endorsed raising of $10,000. Address Reeve Smith, Burlington, Ont.

Forest, Ont.
Bp-law carried for Carnegie library. Architect, W. A. Mahoney, Guelph, prepared plans in the summer which called for 2-storey brick, cut stone, hot water heating, electric lighting, slate roofing, Georgia pine interior finish, plate and art glass.

Hamilton, Ont.
Tenders will be called for library fittings, Main and Charles streets, for Hamilton Public Librarp Board. Librarian, Adam Hunter. Architects, A. W. Peene, 2 King street, Ottawa. Tenders will be called by librarian about first week in March for interior fittings for new $75,000 library. Roof on bldg.

The by-law carried for underground public lavatory, cost $18,000, King and Hughson streets. A. W. Peene, architect, 2 King street west, has prepared plans. Contracts will be called about March.

By-law carried for fire station, cost $85,000. Two storeys, concrete foundation, brick construction, stone trimmings, five double doors. Architects, Stewart & Witton, 2 Hughson street S.

A. H. Vincent, 25 Old Bond street, London W., England, is arranging for purchase of a site here for a new theatre, seating capacity about 4,000. Cost $200,000.

Kincardine, Ont.
Tenders are open for school house for Board of Education. Address Wm. Ewans, Kincardine. Tenders close January 18th.

London, Ont.
The by-law carried for garbage incinerator, cost $50,000. City Engineer, G. W. Wright. City Engineer will prepare plans at once.

Longue Pointe, Que.
Cure of St. Francis of Assissi, through attorney, will apply to Legislature for permission to raise funds for erection of new church. Matter to be dealt with at next sitting. No architect has been chosen.

Lions Head, Lake Huron, Ont.
Tenders are called for wooden lighthouse tower until noon, February 5th, by A. Johnston, Deputy Minister of Marine & Fisheries. Plans, etc., at the Department, Ottawa, at the Agency of this Department, Parry Sound, and at the post offices, Lions Head, Owen Sound, Collingwood and Wiarton.

Montreal, Que.
The Duchess Amusement Company, (S. M. Jacobs, K.C., 509 Power Bldg., Montreal), are contemplating the erection of several moving picture theatres.

Contemplated, Hebrew Association headquarters for the Young Men's Hebrew Association. President, J. Goldstein, 998 Dorchester street. Financial secretary, M. Goldberg. Building to contain school, library, gymnasium, baths, employment office and auditorium.

Montreal Baseball Club, Limited, 32 Merchants Bank Building, St. Catherine street west, Montreal, contemplate erecting bleachers, cost $5,000. S. Lichtenstein, managing director. Structure likely of frame; seating capacity 2,500. No plans ready yet.

The Catholic School Commissioners have made application to borrow $500,000 for new schools and additions. Secretary-treasurer, Ulric Lafontaine, Court House. No plans prepared yet.

City of Montreal is considering improvements to Champ De Mars to the extent of $50,000. City Engineer, G. Janin. Stone work required.

Board of Ladies are applying through solicitors, Loranger & Prud'homme, attorneps to Quebec Legislature, for power to reconstruct Roman Catholic Orphan Asylum at 236 and 267 St. Lawrence Ward. Architect not yet appointed.

Present site of Stanley Presbyterian Church, Stanley street, is being sold. Another one will be bought and new church built.

Point Grey, B. C.
Plans will be prepared shortly for several large additions to schools in Point Grey. Work will start early this year. School architect, J. H. Bowman, Crown Building.

St. Thomas, Ont.
The ratepayers carried by-law to expend $10,000 on Isolation Hospital by large majority. Mayor, B. N. Price. Architect, J. F. Finday, St. Thomas.

Tilbury, Ont.
Plans will be prepared at once for new fire hall for Corporation of Tilbury. Mayor, W. C. Crawford. Work will be rushed.

Toronto, Ont.
Tenders will be called for alterations to picture theatre, cor. Queen and Lee avenue, to cost $3,000, fro R. W. Sexton.

The Board of Education, secretary, W. C. Wilkinson, have under consideration the installation of vacuum cleaning systems in ten schools. Matter will be placed in charge of sanitary engineer to be appointed.

Tenders will be called by Board of Education, Secretary, W. C. Wilkinson, for Wiring Humberside and Riverdale High Schools, also Perth school.

Victoria, B. C.
Ald. O'Kell and G. A. B. Hall, M.R.O., has recommended that funds be set aside for addition to Aged Men's Home to be used as hospital. Two storey brick addition with two wards is recommended.

Walkerton, Ont.
The by-law for erection of Carnegie library carried by good majority.

Weston, Ont.
The ratepayers carried by a majority of 137 the by-law to build a Carnegie library.

CONTRACTS AWARDED

Montreal, Que.
Work has started on picture theatre and residence, cost $6,000, St. Laurent street, for Guenette & Moxmon, 2817 St. Laurent. General contractor, M. Poirier, 73 St. Zotique street, Montreal. Two storeys, 26 x 100, brick, stone foundation, hot water heating, gas and electric lighting, gravel roofing.

Foundations are in and steel is up for post office, cost $100,000, St. Catherine street east, for Federal Government, Ottawa. Architect, Joseph Perrault, 2106 Park avenue, Montreal. General contractors, Seguin & Guindon, 1202 Mount Royal. Masonry, T. Gilbrault, 514 Alma street. Carpentry, H. Mathieu & Company, 14 St. Charles Borromee. Plumbing, heating and roofing, Bourbonniere, 418 St. Catherine street east, Montreal. Electric wiring, G. A. DeGuire & Co., 391 Bleury street, Montreal. Painting, plastering and tile work not awarded yet.

Ottawa, Ont.
A site is being prepared for smallpox hospital, Porter's Island. Architect, F. C. Sullivan, Ottawa. General contractor, Geo. Crain, Clemow ave., Ottawa. Three storeys, solid brick, concrete foundation, electric lighting.

Saskatoon, Sask.
Church, cost $120,000, Fourth avenue and 25th street, for Congregation of Knox Church. Architects, Brown & Vallance, 1006 McArthur Building, Winnipeg. Contractor, R. J. Lecky, Regina, $120,000. Pressed brick with stone trimmings, seating capacity 1,000. Contract price does not include seating or organ.

Residences

Montreal, Que.
Foundation is done for four flats, cost $3,200, Aylwin street, for Wm. Bedard, 421 Aylwin street. Three storeys, 25 x 35, "Columbus" pressed brick, concrete foundation, gas and electric lighting, gravel roofing.

North Vancouver, B. C.
Plans are being prepared for apartment house. Architect, G. P. Bowie, Bank of Ottawa Building. Plans ready only for filing—not for figuring on for some time.

Orillia, Ont.
The Orillia Building & Realty Company, Orillia, Manager, H. McLean, will be ready to start in spring on the erection of sixty residences, $1,200 each, Moffat Farm. Two storeys, 20 x 28, cement construction, stove heating, hard wood interior finish, shingle roofing.

Point Grey, B. C.
Plans are completed for residence, cost $8,000, Second avenue, for F. W.

Stirling. Architect, W. A. Doctor. 34 x 49, stone basement, stone and rough-cast plaster, nine rooms, with hall, specitl hot air heating plant, shingle roofing, tile, etc. No tenders taken on general contract.

South Vancouver, B. C.

Plans are completed for apartments, cost $10,000, 20th avenue east, for I. H. Angleman. Owner will supervise building and purchase all material. Hot water heating will be required.

Toronto, Ont.

A permit has been issued for pair of dwellings, cost $4,500, 179 Quebec ave., for R. Stanley, 733 Markham street. Architect, S. Smith, 30 Shannon street. Two and one-half storeys, semi-detached, brick, tar and gravel roofing, hot air heating, electric lighting.

Tenders are open for three pair of dwellings, cost $11,000, 728-38 Ossington avenue, for R. McCanley, 11 Barton avenue; architect, J. H. Stanford, 17 Westmoreland avc. Two storeys and attic, stone and brick, tar and gravel roofing.

Tenders are open for residence, cost $7,000 (also garage, St. Andrews Gardens, for Victor A. Good, 18 Wellington street. Architcct, C. J. Gibson, 75 Yonge street. Two and one-half stys., brick, stucco, half timber gables, stone, cut stone, slate roofing, hot water heating, 936 ft. radiation, electric light, tile, mantles, plate glass, galvanized iron cornice, hardwood floors, oak, electric bells, speaking tubes.

Plans are drawn for apartments, cost $9,000, Cor. Grange and Huron, for Jones & Company, 8 Wellington street east. Two storeys and basement.

Excavation is done for pair of dwellings, cost $5,000, S. S. Marchmont road, for E. Norman, 29 North Markham. Architect, P. H. Finney, 43 Victoria st. Two storeys, semi-detached, brick, tar and gravel roofing.

Tenders will be called for apartments, cost $6,000, for J. H. Young. Architect, W. H. Mallory, 31 Queen street west. Two storeys and basement, Credit Valley stone.

Excavation is done for pair of dwellings, cost $8,000, W. S. Ferndale ave., for F. E. Gibson, 53 Woodlawn avenue. Two storeys, semi-detached, brick.

Tenders are open for residence, cost $4,000, 28 Hurondale ave., for F. W. Hill, 92 Church street. Architect, P. H. Finney, 43 Victoria street. Two and one-half storeys, brick, hot water heating, hardwood floors.

Permit has been granted for pair of dwellings, cost $3,600, W. S. Pauline ave., for Forman Pennock, 73 Vanalley street. Two storeys and attic, brick and stone.

Plans are contemplated for apartment house, cost $7,000, 108 Elm street, for Messrs. S. Caplan Bros. and J. Layneskey, 41 Bellwoods ave. Architect, J. Gladwin Hedges, 86 Clinton street. Two storeys and basement, brick, felt rfg.

Tenders are called for two pair of dwellings, cost $8,000, Cheltenham ave., for W. J. Grant, 29 Callendar street. Architect, Allen Trainor, 64 Grace st. Two storeys, brick, semi-detached. Received by architect.

Tenders will be called for two dwellings, cost $5,000, Vernon street near Gilmour avenue, for Sam. Kosenfeld, 235 Gilmour avenue. Architect, W. Melliship, 193 Gilmour ave. Two sty., brick, detached, slate and tar roofing, cut stone, stucco, art glass, burlap, oak floors, interior finish.

The Proctor Estate, 10 Wellington E., plan to convert residence into apartments, cost $8,000, 71 Grenville street. Architect, Langley & Howland. Three storeys, brick addition, structural steel, cut stone, burlap, seven bathrooms, 19 basins, hot water heating. Tenders to be called.

Tenders are called for residence, N.E. Heath and Forest Hill Road. Architect, F. S. Baker, Traders Bank Building, Toronto. Received by architect for all trades until noon, January 15th.

Vancouver, B. C.

Permit has been granted for apartment and store, $132,000, Broadway E., for Goldbloom & Kracobsky, 210 Pender st E., Vancouver. Architects, Townsend & Townsend, 520 Granville street. Five storeys, 66 x 120, full basement, hot water heating, tar and gravel roofing, 37 sets of baths, 42 of plumbing, marble entrances, wiring, elevator.

Permit has been applied for to erect an apartment house, cost $75,000, for McNeil Bros. Architects, Townsend & Townsend, 520 Granville street. Four storeys, brick, hot water heating, 29 suites. Architects ready for tenders.

Plans are being prepared for residence, 39th ave., for Mrs. F. J. Fenton. Company in charge, Vancouver Freehomes Limited, 612 Hastings street west. Two storeys, hot air heating.

A permit has been issued for two apartment houses, cost $18,000, for Merchants Trust & Trading Company. Architect, Geo. P. Bowie, Bank of Ottawa Building, Vancouver. Two storeys, 55 x 50 each, frame, hot water heating. Plans not completed. Tenders taken by architect from selected contractors only. Construction to begin early in spring.

CONTRACTS AWARDED

Montreal, Que.

Apartment house, cost $200,000, Bishop street, for O. L. Henault, 4545 Sherbrooke street west, Montreal. Architect, C. A. Mitchell, 58 Beaver Hall Hill, Montreal. Piling contractor, J. H. Wood & Son, 27 St. Edward street, Montreal. Concrete foundation, Heffernan & Beck, St. Catherine street west. Ten storeys, 50 x 120, steel frame, terra cotta facings, concrete foundation, steam heating, gas and electric lighting, roof garden, interior finish marble, mosaic and hardwood, refrigerating plant, mail chutes, gas stoves for each apartment, telephone system, electric bells, plate glass throughout.

Outremont, Que.

Cottage, cost $10,000, McDougall ave., for Messrs. Holland & Langridge, 280 McDougall avenue. Masonry J. Abel, 698 St. Andre, Montreal. Plumbing and heating, W. H. Dance, 2321 St. Lawrence Boulevard. Painting and glazing, M. Trueman, 280 McDougall avenue. Two storeys, 24 x 40, solid brick and stone, hot water heating, gravel roofing, electric light, stone foundation. On completion of this house a $20,000 residence will be commenced on same ave.

Toronto, Ont.

Residence, cost $10,000, Wychwood Park, for Dr. E. M. Walker, 35 Harbord street. Builder, Orr Bros. Two stys. and attic,

Dwellings, cost $5,500, 446-50 Westmoreland avenue, for R. O. Dickson, 329 Rusholme road. Architect, J. H. Stanford. Builder, J. Travers.

Apartments, cost $3,500, E. S. Avenue road, for Thos. McIlwain, 147 Jameson avenue. Architect, R. J. Edwards & Saunders; builder, Wm. Hall & Son. Three storeys, brick, tar and gravel roofing, structural steel, cut stone, mantles, hot water heating.

Two pair dwellings and stores, cost $8,000, St. Clair avenue, for F. M. Tuckett, 53 Indian road. Builder, R. Thompson. Two storeys, tar and gravel roofing, plate glass, hot air heating.

Residence, cost $2,500, Lippincott st., for Mary Conway, 327 Lippincott street. Builder, Wm. Moloney. Shingle roofing, Roman stone, hot water heating, electric light.

Attached dwellings, cost $7,200, on Eastern and Pape aves., for Col. W. H. Merritt, King Edward Hotel. Architect, H. J. Chown. Builder, H. C. Dies. One storey, roughcast.

John Handen, builder, 7 Conduit st., will build two detached dwellings, cost $10,000, 12-14 Algonquin. Solid brick, shingle roof, hot air heating.

Foundations are started for residence. cost $8,500, w.s. Russell Hill Drive, for Fred Holt, Victoria street. Architect, Designing & Draughting Co., Toronto street. Builder, Wm. Halls & Son, 54 Hewitt ave. Two and one-half stys., cut stone, mantles.

Larkin & Reeves, 181 Perth avenue, are excavating for three pairs of dwellings, cost $12,000. S. E. cor. Perth and Davenport road. Builder, H. Larkin. Two storeys, brick, semi-detached, stone foundation, tar and gravel roofing.

Recent building permits include: B. Ransceit, two and a half storey brick dwelling, near Heath, on east side Oriole, $5,500; J. Devonshire, one pair semi-detached two storey stucco dwellings, near Kingswood road, on north side Queen street, $6,000; J. Kvle, one and a half storey brick theatorium on 173 Roncesvalles, $7,000; J. H. Mills, one pr. semi-detached two storey brick dwellings, on southwest corner Lansdowne and College, $5,500; F. R. Perkins, two storey and attic brick dwelling, near Binscarth road, 126 Glen road, $5,000; Wilkins & Co., one pair semi-detached two and a half storey brick dwellings, 18-20 Chicora, $7,000; W. J. Grant, two pair semi-detached two storey brick dwellings, near Prust, on Cheltenham, $8,000; Proctor Estate, three storey brick addition to dwelling, near Yongc, 71 Grenville, $8,000; S. Rosenfeld, two detached two storey brick dwellings, near Gilmore, on Vernon, $5,000; T. McIllwain, three storey brick apartments, on east side Avenue road, $35,000; F. E. Gibson, one pair semi-detached two storey brick dwellings, near St. Clair, on west side Ferndale, $8,000; C. Wilson, Ltd., two storey brick alteration to factory on 519 Sherbourne st., $6,000.

Business Buildings and Industrial Plants

Brantford, Ont.

Work is about to begin on planing mill, cost $3,000, for Ingleby, Fitness &

Taylor. 44 Burford street, Brantford. Two storeys, 50 x 70, brick, concrete foundation, steam heating, electric lighting, interior finish pine, planers, jointers, shapers, stocker, lathe, band saw, rip saw, mortiser, tenoner, one 25 h.p. gas engine, one 17 h.p. gas engine. Owners are builders.

Brickton (Anna Co., N. S.)

The Farmers' Co-operative Company contemplate erecting an apple storage building, cost $4,000. Manager, E. C. Schaffuer, Williamston, Annapolis Co., 150 ft. x 40 ft. Wood or brick construction. This building will probably be built next summer. Address E. C. Schaffuer.

Cowichan, B. C.

The Bulman Lumber Company's plant recently destroyed by fire will be rebuilt shortly. A larger mill will be built at Cushion Cove and the Victoria plant also re-built.

Dundas, Ont.

Quarry buildings of Doolittle & Wilcox, Dundas, wrecked by explosion. Frame buildings to be replaced at a cost of $2,500.

Edmonton, Alta.

Tudhope, Anderson & Company, Ltd., 162 Princess street, Winnipeg, are planning a warehouse for manufacture of carriages and agricultural implements. 50 x 150, cost $35,000. Construction to start in spring and rushed to completion. Local manager, R. L. Hoar.

Falmouth Station, N. S.

Falmouth Farmers, Limited, plan to erect a barrel factory and warehouse next summer. James Smith, C. N. Wilson, Rev. W. T. Suckling and others, of Falmouth, are interested.

Grand Forks, B. C.

Granby Consolidated Mining, Smelting & Power Company are contemplating the erection of a smelter, cost $1,500,000, for Hidden Creek property. Secretary, Northup Fowler, 52 Broadway, New York City; director, Geo. W. Wooster, Grand Forks, B. C. ... ...

Hamilton, Ont.

Biggar & Gauld, Canada Life Building, contemplate remodelling hotel, cost $6,000, King street east. Additional storeys, new front, new bar and offices, fixtures required. Architect not chosen.

Harriston, Ont.

Harriston Casket Co. propose building an addition to casket factory. Manager, Reeve Dale. Department for manufacture of oak goods to be added—new machinery will be required.

Hull, Que.

The E. B. Eddy Company have a large addition to their plant under consideration. It is stated work will be done this year.

Kentville, N. S.

E. J. Ward and others are interested in the building of stores and theatre next spring. Cost $7,000.

H. G. Harris is planning to erect a printing office of frame or brick construction to cost $3,000. Work will start in spring.

Kingston, Ont.

The by-law carried for box and envelope factory for Commercial Box & Envelope Co., Ltd. City Clerk, W. W. Sands. Architect, G. R. Beckwith, has been mentioned in connection with plans. City to make certain concessions to company.

Lakefield, Ont.

The Siemon Company, Confederation Life Building, Toronto, contemplate erection of a saw mill here this year.

Lethbridge, Alta.

The Merchants Bank of Canada have made arrangements for purchase of Coaldale Hotel property as a building site, 50 x 59. Possession given about June 30th. It is understood that the bank will occupy the corner.

London, Ont.

The Town decided not to move plant of D. S. Perrin & Company, Limited, to East London. Plans will be prepared by Moore & Munro, architects, 435½ Richmond street, for a six-storey plant. Complete new machinery, ovens, elevators, sprinkler system, box-making machinery, and all interior fittings will be needed. Work will be rushed in the spring. Cost $250,000.

Montreal, Que.

General Trust Company of Canada plan to erect branches in various cities. Beique, Tungeon and Beique, 17 Place d'Armes, are acting for company.

J. H. Maher, 35 Guardian Bldg., will add three storeys to Art Gallery. Building to be converted into up-to-date office building. Work to start as soon as possible after May 1st. Cost $50,000.

J. H. R. Molson & Bros. (brewers), 906 Notre Dame street east, Montreal, are planning to build a new stable to accommodate 135 horses.

The Imperial Wire & Cable Company have purchased several acres of land at Highlands near Lachine as a building site for a new factory. Date for construction not decided on.

Tenders are called for re-building shoe factory, cost $10,000, 331 Demontigny street. Owner, Reformatory School, 341 Demontigny street. Tenants, Tetrault Shoe Mfg. Co. Masonry, carpentry and roofing to be done by contract. Damage to machinery and stock, $100,000. Repairs to machinery to be done by United Shoe Machinery Company, 401 Lagauchetiere west.

C. O. Clark & Bro., 1510 St. Patrick ave., are planning to build an extension to brass foundry, St. Patrick avenue. Architect, Ross & McFarlane, 1 Belmont street, Montreal. Two storeys, 51 x 84, plastic brick, concrete foundation, hot water heating, gas lighting, tar and gravel roofing, mill floors. Tenders were taken last week. Work may not start till spring.

Napanee, Ont.

The by-law carried to erect rock drill factory addition for Dominion Rock Drill Company, Limited. Three stys., 150 x 45, cement brick.

Owen Sound, Ont.

By-law to loan $20,000 for Bolt and Nut factorp for E. Lemon.

Ridgetown, Ont.

Owner, Dominion Canners, Limited, Hamilton, Ont. General manager, J. J. Nairn; president, D. Marshall, Aylmer. The by-law for canning factory was carried by large majority. Building to cost $25,000, Machinery, $15,000. It is stated the factory will be erected in time for fall fruits.

St. Thomas, Ont.

The Anderson Company, Limited, are contemplating addition to business offices, equipment of workroom with power machines, electric passenger elecator to be installed—latest interior fittings to be used. New rest and toilet rooms will be purchased.

Sarnia, Ont.

The by-law to bonus Mueller Manufacturing Company, Decatur, Ill., was carried. Company to invest $100,000 in buildings for the establishing of a brass manufactory. Mayor, John McGibbon.

Sherbrooke, Que.

The Jenckes Machine Company have made arrangements for loan of $100,000, to be repaid in ten years, on the condition that plant be doubled.

Stratford, Ont.

The by-law to loan the Bennewitz Co. $10,000 to assist in starting a factory to manufacture piano stools, cabinets, etc., was carried by a majority of 23.

Toronto, Ont.

The American Abell Company has been absorbed by the M. Rumlev Company, of Laporte, Ind., $25,000,000 corporation. A larger plant is contemplated in the future and extensive addition of machinery will be made to present plant to double output.

Foundations are started for warehouse, cost $8,000, S. S. Davenport road, for Stewart N. Hughes, Yonge street. Architect, F. R. Berry, 1107 College st. Three storeys, brick, concrete and brick foundation, tar and gravel roofing, structural steel, cut stone, tile coping, fire doors, galvanized cornice, skylights, steam heating, fire escapes, elevator, vaults, electric light, asbestos felt.

Winnipeg, Man.

Finnie & Murray, wholesale men's furnishings, 86 Princess street, are contemplating the erection of a new five-storey factory on Adelaide street to cost $150,000. Firm manufactures tents, etc.

Tenders will be called for five stores and apartments, cost $40,000, W. Bloor and Montrose, for Wm. Tremaine, 59 Henderson ave. Three storeys and basement, brick, tar roofing, Roman stone, hot water heating.

Tenders will be called in a month for an addition to office building, $20,000, Victoria and Adelaide streets, for Home Life Association. Brick, plate and wire glass, fire escapes, steel sash, iron stairs, ornamental iron, passenger elevators.

Victoria, B. C.

Plans have been filed for cabinet factory, Garbally Road, for Vernon King. Two storeys, frame. Modern machinery equipment throughout.

Tenders are called for hotel, cost $100,000, Johnson street, for Chas. Hayward and F. S. Barnard. Architects, Breseman & Durfee, 518 Sayward Building, Victoria. Six storeys, 60 x 105, pressed brick and terra cotta, reinforced concrete. Tenders received until January 15th on general contract. Contract does not include heating, plumbing, wiring and elevators.

Plans are prepared for erection of an office building on Fort street, for Dr. O. M. Jones. Architect, S. Maclure,

Maclure & Fox. Two to five storeys, reinforced concrete, steam heating plant, marble entrances, two high speed elevators, hardwood flooring, quarter-cut oak woodwork, interior finish, marble and Honduras mahogany, plate glass partitions, vacuum cleaning plant, fire protection to be installed. Building to be completed by July 1st.

Vancouver, B. C.

Plans are being prepared for store & apartment building, Dunlevy and Jackson avenue, for J. Lewerke. Architects, Parr & Fee, 570 Granville street, Vancouver. Six storeys, 25 x 120. Plans to be ready for tendering on by spring.

Windsor, Ont.

Work has commenced on blower manufactory, cost $10,000, for The Canadian Sirocco Company. New machinery will be purchased.

Weyburn, Sask.

Benj. O. Boyum, architect, is planning a departmental store for the McKinnon Company. Work on basement has already commenced. Building to be steel, brick and cement, cost complete, including power plant and heating, $100,000.

CONTRACTS AWARDED

Maisonneuve, Que.

Excavation is done for five stores and dwellings, cost $60,000, St. Catherine st., for Estate of late Dr. Hingston, 231 Stanley street, Montreal. Architect, W. E. Doran, 180 St. James street, Montreal. General contractor, C. E. Deakin, 11 St. Sacrament street, Montreal. Iron work, Dominion Bridge Company, Limited, Lachine. Two storeys and basement, 100 x 110, brick and stone, concrete foundation, hot water heating, electric and gas lighting.

Excavation is done for store and houses, cost $14,000, 548 St. Denis, for J. E. Migneron, 540 St. Denis street. Architect, J. A. Karch, 17 Place d'Armes Hill. Builder, J. Meloche, 276 St. Viateur street, Montreal. Three storeys, 26 x 100, pressed brick on wood, concrete foundation, hot water heating, gas and electric lighting, flat gravel roofing.

Garage, cost $30,000, University street, for Fraser Institute, cor. Dorchester & University streets. Tenants, The Comet Motor Co., 17 Phillips Place. Architect, MacVicar & Heriot, 104 Union ave., Montreal. General contractors, Church, Ross & Co., 40 Hospital street, Montreal; electric wiring, Sayer Electric Co., 87 Bleury street; brick and masonry, James Morison, 207 Guy street; carpenter, Wm. Evely, 449 Bleury st.; painting and glazing, J. Sears, 1004 St. Catherine street west; heating, J. W. McGuire & Co., Ltd., 332 Craig street west; roofing, Geo. W. Reed & Co., Ltd., 37 St. Antoine street. Two stys., 88 x 88, brick and reinforced concrete. Excavation started.

Foundations are in for store and residence, cost $4,000, Stadacona street, for Onesime Archambault, 105 Jean d'Arc street, Montreal. Three storeys, 25 x 53, brick, gas and electric lighting, gravel roofing, concrete foundation. Owner is builder.

Montreal, Que.

Store and offices, St. Catherine street west, for G. A. Holland & Son Company, 519 St. Catherine street west. Architects, Finley & Spence, 46 Beaver Hall Hill, Montreal; general contractor, C. E. Deakin, 11 St. Sacrament street, Montreal; plumbing and heating, A. McKay & Company, St. Martin street; electric wiring, Philip Lahee & Company, 4840 Western ave., Westmount; elevators, Otis Fensom Co., Ltd. Hone's metal windows, David McGill, 83 Bleury street, Montreal. Gas and electric lighting, tile entrance, show windows of "corner" system (non-freezing), mezzanine flooring in front windows, Rockland sprinkler system, modern vaults for fur storage. Building to be completed by March 15th.

St. Paul, Que.

Extension is being erected to hotel, cost $3,000, Notre Dame street and St. Paul road, for M. Theoret. Builder, Mr. Strain. Contract to be completed by May 1st.

Victoria, B. C.

Undertakers' establishment, Broughton & Wilcox, for B. C. Undertaking Co. General contractor, Thos. Cotterall Co., Ltd., Victoria, $22,596. Two storeys, brick (face and common), terra cotta, marble entrance, hot water heating, tar and gravel roofing, leaded glass, concrete. Building will have chapel, offices, etc.

Power Plants, Electricity and Telephones

Brampton, Ont.

The by-law to purchase Brampton Electric Light franchise carried. Mayor, T. W. Duggan.

Chatham, Ont.

The Chatham Gas & Electric Light Co., Ltd., are planning a fireproof addition, 3,600 square feet, to the engine room.

The council will consider shortly the installation of better lighting on Wellington street.

Chignecto, N. S.

The output of Joggins Mines will be doubled, necessitating installation of electric power plant here by the Maritime Coal, Railway and Water Power Company.

Forest, Ont.

The by-law to take over Forest Electric Light plant and operate it as a municipal concern carried. Extensive improvements are planned.

The corporation is considering the erection of a power house and hydro-electric plant to cost $10,000.

London, Ont.

The City Commissioners are considering development and purchase of necessary electrical equipment early in the year in connection with Springbank dam. Supt. Glaubitz is in charge.

St. Maurice, Que.

The St. Maurice Hydraulic Company are planning the installation of telephone system for transmission lines.

Toronto, Ont.

It is stated by Hon. Adam Beck that the Hydro-electric Commission is considering a site near Stanley Barracks for the next experimental testing station System to extend from Sarnia and Windsor on the west to Cornwall and Ottawa on the east. The estimates for this year involve several million expenditure.

The following municipalities voted in favor of hydro-electric power: Ailsa Craig, Blyth, Brampton, Brussels, Caledonia, Clinton, Cornwall, Exeter, Goderich, Hagersville, Hastings, Hensall, Kincardine, Kingston, Lakefield, Listowel, Lucan, Owen Sound, Paisley, Paris, Peterboro, Prescott, Richmond Hill, Southampton, Tillsonburg, Thornbury, Welland, Wingham, Wroxeter.

White Rock, Kings Co., N. S.

The Nova Scotia Power Company is being merged with a similar concern with interests on the Mersey river in Queens County and perhaps, also, with the Halifax Electric Tramway Company. Plans are being prepared for a power house on the Gaspereau river at White Rock. Requiring: 6 dams, 175 ft. to 500 ft. long x 8 ft. to 20 ft. high; 2½ miles of canal; a wooden flume 8 ft. x 8 ft. x 5 miles; 2,000 feet steel penstock; over 120 miles of transmission line, steel towers. Interested, F. B. McCurdy, Halifax; J. W. McConnell, 32 Bank of Ottawa Building, Montreal. Engineers, A. Adams, Halifax; Arch. Foster, resident engineer, Kentville, N. S.

Woodstock, Ont.

By-law to raise $10,000 for extension of street lighting carried by 500 majority. Mayor, Dr. A. B. Welford.

Business Notes

London, Ont.

The amusement hall connected with main building of Asylum for Insane, was destroyed by fire with loss of $30,000. Plans to be prepared at once, construction to be fireproof, steel window frames and sashes, slate roofing.

Address, Dr. Robinson.

Montreal, Que.

On January 2 fire damaged the grocery store of Gravel Freres; the fur store of Alex. Nelson, and the tailor shop of Wills & Wills, St. Catherine street and McGill College ave. Damage to buildings about $10,000, and to stock $20,000. Repairs to be made at once. Cafe will require fittings and refrigerator.

Brothers of Charity Reformatory School, Demontigny and St. Denis sts., burned, loss $20,000. New school fittings, desks, electric fixtures required.

The Robinson Shoe Company's factory damaged to extent of $20,000.

Ottawa, Ont.

The block on Albert street owned by Milton Graham, dentist, Ottawa, and syndicate, was completely destroyed by fire on January 1st. Loss $50,000. Insurance $15,000.

Stonewall, Man.

The Bank of Hamilton and suite of offices were gutted by fire on December 28, 1911.

Victoria, B. C.

Fire destroyed the Assembly Roller Rink on Fort street and two residences adjoining. Loss estimated at $25,000.

Westmount, Que.

G. F. Johnston's stable "Sylvancrest," Bellevue ave., damaged to the extent of $3,500. Re-construction will start at once.

Winnipeg, Man.

Brick hotel, near Main street subway, Proprietor, Edmund McKenty, damaged by fire; estimated at about $3,000.

Tenders and For Sale Department

To Engineers

Every man who puts in a tender on your jobs has got to see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

More contractors and manufacturers read the "Contract Record" than any other Canadian publication. It is the logical place to look for tenders called, and where all important works are advertised.

Send along your plans for your next job and put a line in your ad. to that effect.

Contract Record

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—441 Seymour Street.

Debentures For Sale

The Corporation of the Town of Steelton will receive tenders up to 8 o'clock p.m., **January 16th, 1912**, for the purchase of: $82,000 Sewer Debentures, running 30 years, and $32,000 Cement Walk Debentures, running 20 years.

Full particulars on application to

52-2 J. ROBINSON, Clerk.

Tenders Wanted

For the several trades required in the erection and completion of a proposed Church of England Building at Sudbury, Ont., will be received up to noon, **Thursday, February 1, 1912.**

Plans and specifications may be seen at Secretary's office, Bank of Montreal, Sudbury, Ont.

The lowest or any tender not necessarily accepted.

All tenders to be on forms provided, to be sealed, marked "Tender" and addressed to

W. J. MONTGOMERY,
Sec. Building Committee,
Church of Epiphany,
Sudbury, Ont.
Sudbury, Dec. 12, 1911. 51-1F

Tenders for Steel Bridge

Sealed tenders will be received till 4 p.m., **Wednesday, January 23rd, 1912**, for the erection of a steel bridge over the Saugeen River, 10th Concession, Township of Brant. Bridge to consist of two spans of 125 feet each and one span of 90 feet, or two spans of 165 feet, 16-ft. roadway and with concrete floor.

Also tenders for two abutments and two piers for same to be built of concrete. A separate tender is required for bridge and abutments, and enclosing a marked cheque payable to the Treasurer of the County of Bruce for $200 for each tender.

The lowest or any tender not necessarily accepted.

Specifications may be seen with the undersigned.

JAMES WARREN,
Engineer in Charge.
Walkerton, Dec. 26th, 1911. 52-1F

Sewer Excavator

For sale for immediate use, a Vulcan "Little Giant" Steam Shovel with extra long dipper handle for excavating to 16 feet below surface, mounted on traction wheels, dipper 1¼ yd. capacity. Machine just overhauled; new chain, and extra large new boiler; weighs 32 tons; low price. Address

WILLIS SHAW MACHINERY Co.,
39 South LaSalle Street,
42-t.f. Chicago, Ill.

New Parliament Buildings

Winnipeg, Man.

The Government of Manitoba will receive competitive drawings for New Parliament Buildings to be erected in the City of Winnipeg.

Copies of regulations governing the competition may be obtained from Mr. James Hartney, 77 York Street, Toronto.

COLIN H. CAMPBELL,
2-2 Minister of Public Works.

Notice to Contractors

Main Drainage Works

Sealed tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon of **Tuesday, January 16th, 1912**, for the supplying and driving of Timber Sheet Piling at the Sewage Disposal Works site.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Tenderers shall submit with their tender the names of two personal sureties, approved by the City Treasurer, or in lieu of said personal sureties the bond of a Guarantee Company, approved as aforesaid.

Plans and specifications may be seen and forms of tender obtained from the Main Drainage Department, at the office of the City Engineer, Toronto.

The usual conditions relating to tendering as prescribed by City By-law must be strictly complied with, or the tender will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman, Board of Control.
City Hall, Toronto,
December 30th, 1911. 1-2

Contract to Let

Parties having about 60 or 70 miles of heavy ballasting and trainfilling to do, are willing to sub-let the work to substantial people provided same will rent rolling stock, Lidgerwood and cars now on hand. Apply Box 402, Contract Record, Toronto, Ont. 1-4

For Sale

Ayr electric light plant in first class condition, steam power, good service and contracts. Exclusive franchise in town of 1,200. A splendid chance for a practical man. Being sold because of owner's death. Apply D. M. Clark, 15 McKenzie Crescent, Toronto, Ont. 2-4

Miscellaneous

Advertisements under this heading two cents a word per insertion. Minimum charge 50 cents

Large United States firm manufacturing transits, levels, and complete line of engineering and architectural instruments, wants Canadian representatives. Apply Box 398, Contract Record, Toronto, Ont. 52-2

Tender for School Building

The Brantford Public School Board ask tenders for the completion of a new ten-room school on Chestnut avenue.

A cash deposit of five per cent. by marked cheque to the order of the Treasurer of the Board must accompany each tender.

Tenders will require to be in the hands of the undersigned at his office in the City Hall, Brantford, by 12 o'clock noon on **Saturday, the 27th day of January, 1912.**

Plans and specifications and conditions of tender may be seen at the office of Taylor & Taylor, architects, Hope Building, Brantford.

A. K. BUNNELL,
Secretary-Treasurer.
Brantford, Jan. 5, 1912. 2f

Tenders Wanted

Sealed tenders and marked "Tender," and addressed to Wm. Lane, Goderich, Ont., or to the undersigned will be received until noon on **January 23rd, 1912.**

For the manufacture and erection of a steel bridge to be erected over a branch of the Maitland River on the boundary of Hullett and McKillap Townships. County of Huron, about three miles from Seaforth, a station on the G. T. R.

Bridge to be designed according to Ontario Government Specifications, 1905.

Pratt truss. 100 feet clear span, concrete floor, or Warren truss, 90 feet clear span, concrete floor.

Width of roadway 16 feet.

Distance from floor to bed of stream 13 feet.

Strain sheet and accepted cheque equal to 10 per cent. of contract must accompany tender.

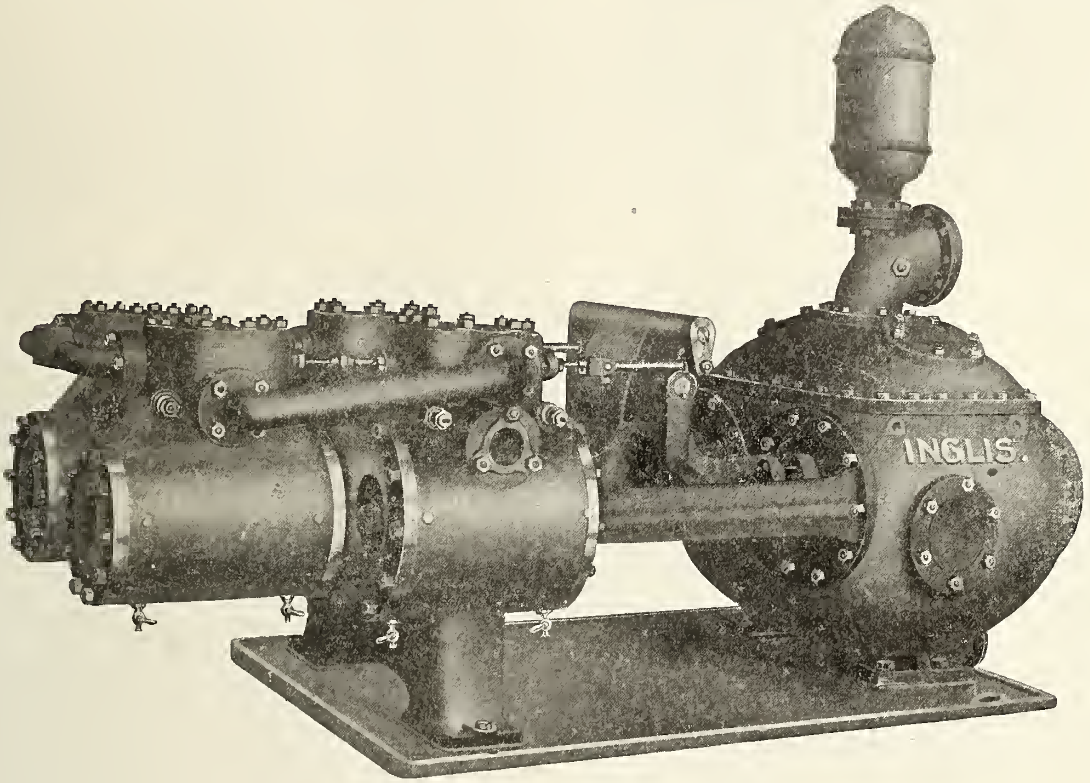
The lowest or any tender not necessarily accepted.

Bridge to be completed on or before the 15th day of August, 1912.

D. PATTERSON,
County Commissioner,
Auburn, Ont.
Dated, Jan. 3rd, 1912. 2F

Water-Works Plants

for Towns and Cities



"Inglis" 1,000,000 gall. Pumping Engine.

Our long and successful experience in the building and installation of Pumping Engines and Water Works Machinery should be a strong argument in favour of "Inglis" products. During the fifty-two years (52) our plant has been in operation, we have built many Pumping Engines, all of which have given entire satisfaction.

Capacities from one to thirty million gallons per 24 hours.

Send us your inquiries.

The John Inglis Company
Limited

Engineers and Boilermakers

14 Strachan Ave., TORONTO, Canada

Canadian Supply Co.

ROOFING CONTRACTORS

Roof of Varsity Stadium

The above view is an illustration of one of the many buildings on which we have laid our roofing materials.

We will be pleased to tender on your roofing specifications.

Canadian Supply Company

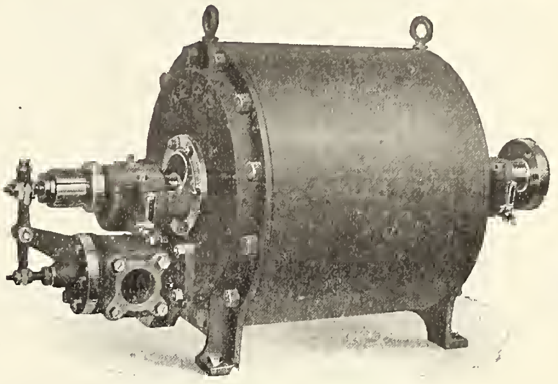
220 KING STREET WEST
Toronto

Kerr Turbo-Pumps

for Power Plants

Kerr Turbo-Pumps are in a class by themselves for feeding boilers, circulating condenser water, for fire service, general water supply, etc.

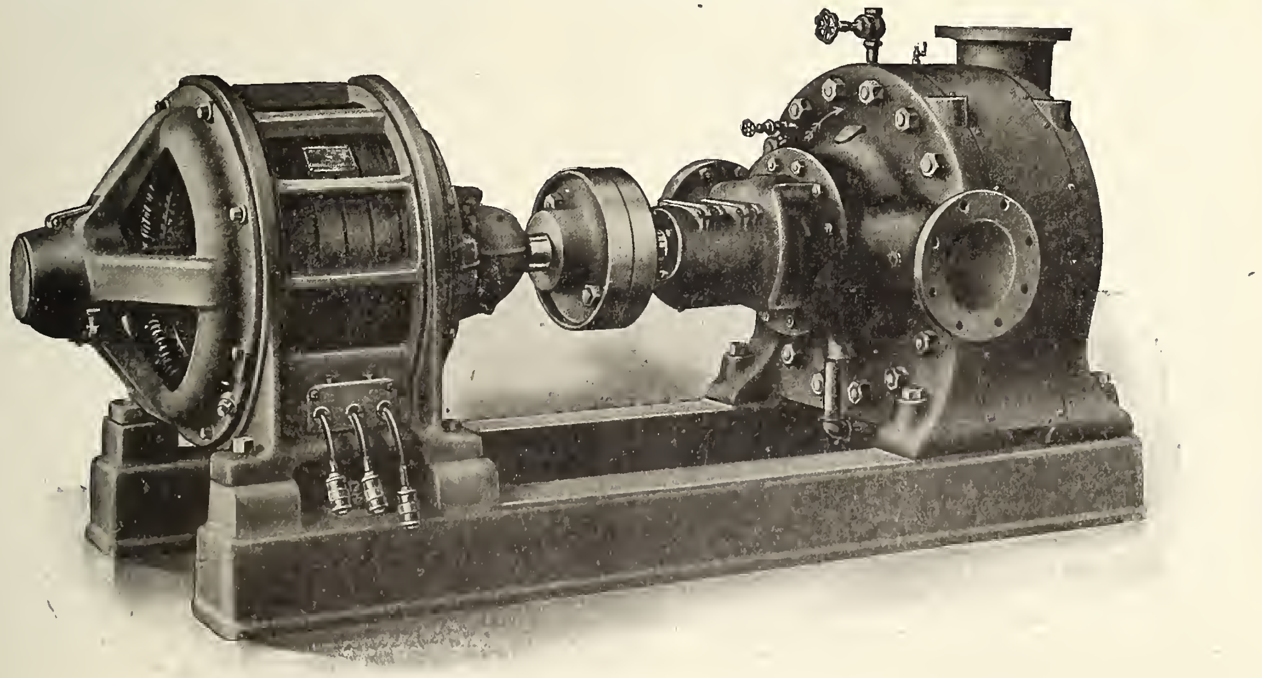
A Kerr Turbo-Pump is simplicity itself compared to any single or duplex reciprocating pump —smaller, no unbalanced parts, fewer places to use oil and waste, no adjustable parts to get out of order, no close fitting parts inside where wear can increase the consumption of steam, and always ready to start on short notice. There is no clicking noise, no vibration to necessitate a heavy foundation, and above all *no oil gets into the exhaust steam.* If interested, ask for Turbo-Pump Bulletin No. 20.



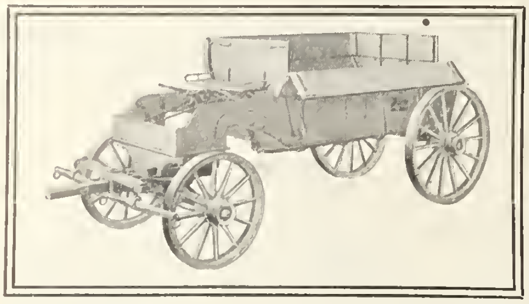
Kerr Steam Turbine

THE JOHN McDOUGALL
CALEDONIAN IRON WORKS CO.
LIMITED
WORKS: **512 WILLIAM STREET, MONTREAL**
Sales Offices: MONTREAL TORONTO COBALT WINNIPEG CALGARY VANCOUVER

Electrically Operated Turbine Pumps for All Duties



CANADA FOUNDRY COMPANY, Limited
TORONTO MONTREAL HALIFAX OTTAWA COBALT WINNIPEG CALGARY VANCOUVER NELSON



A New York State Contractor

had some very short-coupled dump wagons. They were continually stalling his teams on the dump and the rear axles ran dry too soon. He couldn't understand why. He had to grease them nearly twice as often as seemed necessary.

Too close coupling was causing all his trouble. The bottoms lacked proper clearance, thus stalling the teams. And about 80% of the load was on the rear axle. Both these short-comings are inevitable with the very short wagons. This contractor now uses Watsons. With bottoms down there is sixteen inches clearance. No stalling, and a properly divided load. His troubles were real, but unnecessary. Is there a suggestion here for you?

Watson Wagon Co.

CANASTOTA, N. Y.

The World's Largest Dumping Wagon Builders

BRANCH OFFICES:
256 Broadway, New York, N. Y.
601 Witherspoon Bldg., Philadelphia, Pa.
1102 Farmers's Bank Bldg, Pittsburgh, Pa.
607 Security Bldg., Chicago, Ill.

SHAWMUT VITRIFIED PAVING
——BRICK WORKS——

SHAWMUT PA. **ALFRED YATES, GEN. MGR**

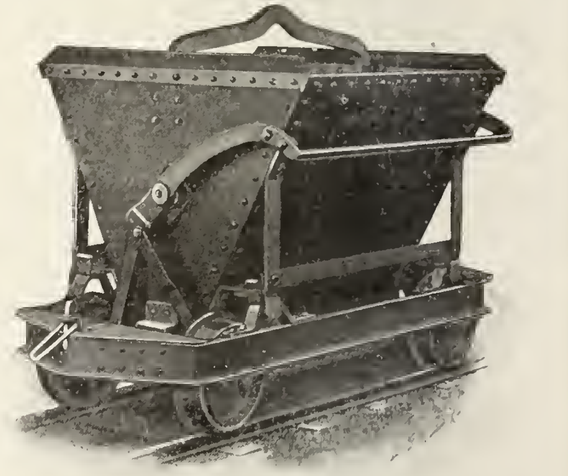
Vitrified Shale and Fire Clay
Paving Bricks and Blocks

Burned in Yates' Patent Kiln

Samples and Prices on Application

Doud's Bucket and Car

The advantage of this combination are time saving and no waste of material.
It is equipped with controllable discharge. Material may be deposited through the rails or the bucket may be lifted from the truck with ease.

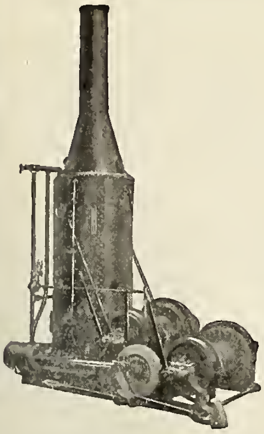


THE
Acme Equipment & Engineering Co.
Garfield Building, CLEVELAND, OHIO
SELLING AGENTS
The Dominion Equipment & Supply Co., Winnipeg, Canada

RADIAL BRICK CHIMNEYS

H. R. HEINICKE, Inc.
65 Victoria St., Montreal, Que.
Chillas-Black, Ltd., Mail Bldg., Toronto, Ont., Agts.
147 Fourth Ave., New York

Consult Us—We are Experts—30 years' experience—Chimneys in all parts of the world



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CATALOG?

It's a beauty, and the largest and best catalog of

Hoisting Machinery

ever published in Canada.

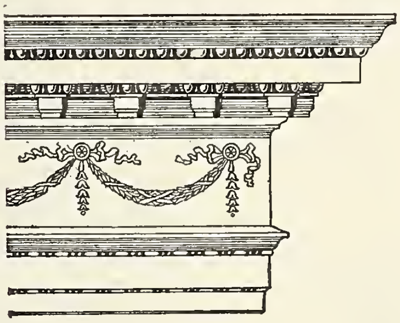
And why should it not be the Best Catalog, for does it not describe the Best Hoisting Machinery made in Canada?

This book also shows a splendid assortment of Derricks and Derrick Parts, Steel Buckets, Steel Skips and Steel Cars, and many other articles used in connection with Hoisting Machinery.

If you are interested in these goods drop us a line, so we may mail you one of these fine catalogues. You will not be sorry.

Marsh & Henthorn, Limited
Belleville, Ont.
Makers of Hoisting Machinery
Sales Agents: MUSSENS Limited, Montreal

Galvanized Cornices

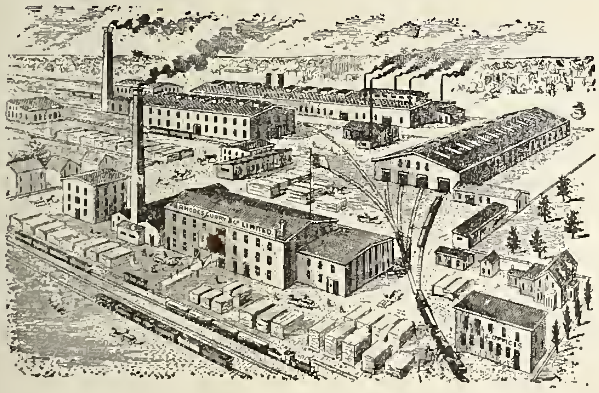


Our catalogue of galvanized cornices will aid you to decide on a suitable style of cornice for any job.

Gladly sent, together with price list, to any archtect or builder. Special cornices made to any detail.

The Metallic Roofing Co. LIMITED
Manufacturers
TORONTO, ONT. WINNIPEG, MAN.
(45)

Rhodes, Curry Co., Limited
Lessees



Bank and Office Fittings

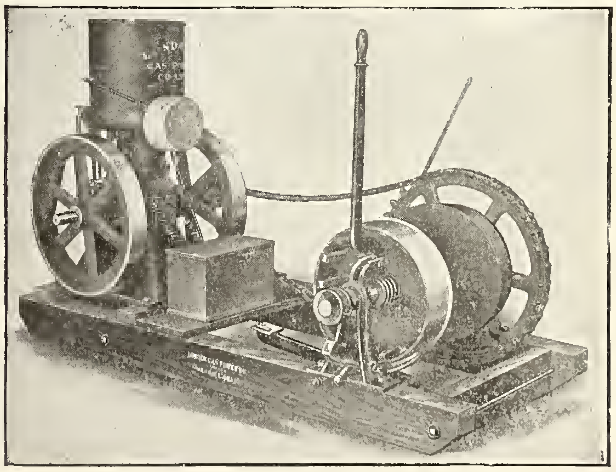
SCHOOL DESKS A SPECIALTY

We manufacture all kinds of building materials, including cast iron columns, cresting, sash weights, etc.

In addition to our large stock of native lumber, we are now carrying about one million feet of foreign lumber, including oak, walnut, ebony, whitewood, basswood, red cedar, Douglas fir, mahogany, &c.

Rhodes, Curry Co., Ltd. Amherst, N. S.
BRANCHES AT
Halifax Sydney

Do You Want a Good Hoist?



PATENT APPLIED FOR

"London" Friction Clutch Hoist

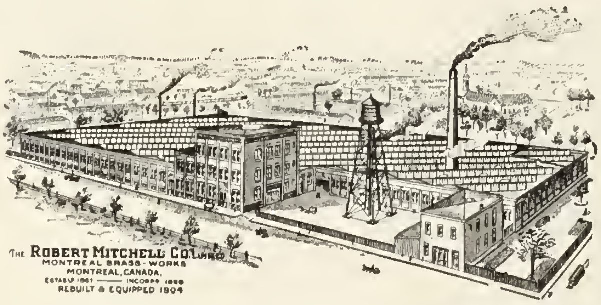
Here are a few of its many uses

Contractor's Work	Mortar Conveying	Well Digging
Bridge Building	Sewer Building	Pile Driving

This hoist can be used with any make or style of gas, gasoline or oil engine

The London Gas Power Co., Limited
Engineers and Machinists London, Canada

The Home of the Mitchell Fixture



The largest manufacturers of Brass in Canada.

Mitchell Chandeliers

are

Made in Canada

We are going to use the same old resolution again this year :—

"To produce in Canada Fixtures that are so good in quality and design, and so reasonable in price, that Canadians will be pleased to buy within their own borders."

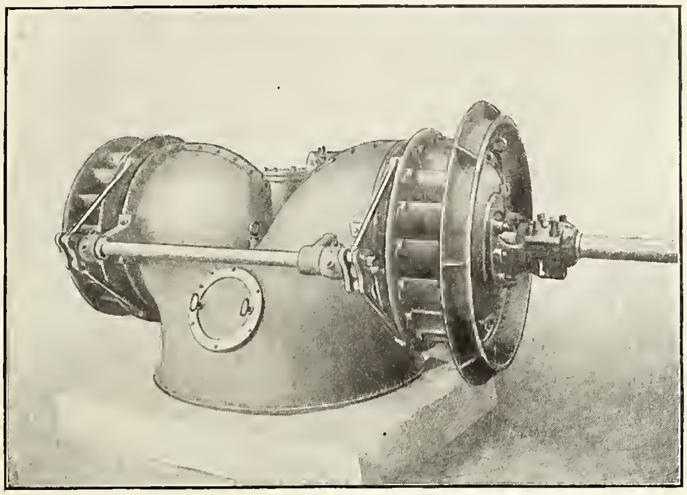
If you are erecting an Office Building, Hotel, Church or residence send us a card when you are ready to take up the lighting question. We want to show you that we can make good to every detail of that resolution.

The
Robert Mitchell Company, Limited
Montreal

WATER-POWER

Turbines for
High and Low
Pressure

Any Output



Governors of
any Capacity

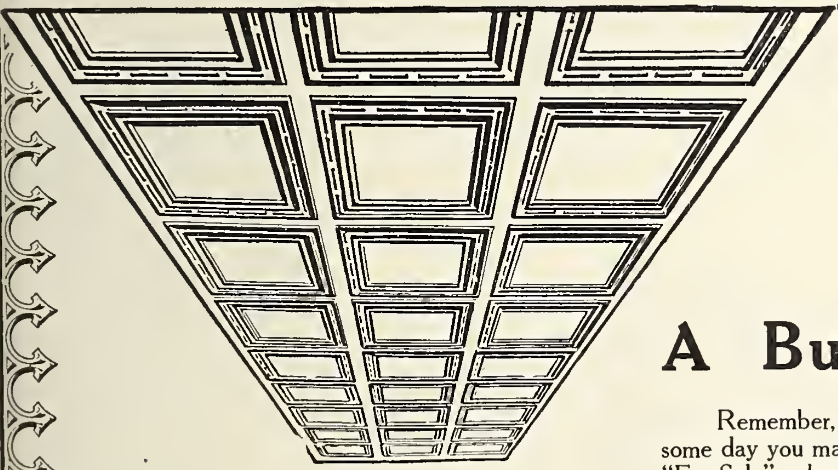
Unequalled
Design

ESCHER WYSS & CO. - ZURICH, SWITZERLAND

CANADIAN HEAD OFFICE, 408 LUMSDEN BUILDING, TORONTO

PHONE, ADELAIDE 234

Representatives in British Columbia:
FRANK DARLING & CO., VANCOUVER



PRESTON

STEEL CEILINGS

Increase A Building's Value

Remember, when building a house or houses, that some day you may be advertising in the "To Let" or "For Sale" columns of the newspapers.

People already know of the advantages of PRESTON Steel Ceilings through the advertising we are constantly placing before them, but even if a prospective buyer or tenant **never** heard of PRESTON Steel Ceilings, he or she must immediately recognize their beauty and utility the moment they see them **in your house.**

NOTE THIS FACT

If you are building houses **to rent,** Preston Steel Ceilings will never need repairs. Careless tenants **may** let the sink or bath run over, but it won't hurt one of our Ceilings. Now, **think what it would do to the plaster.**

OVER 1,100 DESIGNS

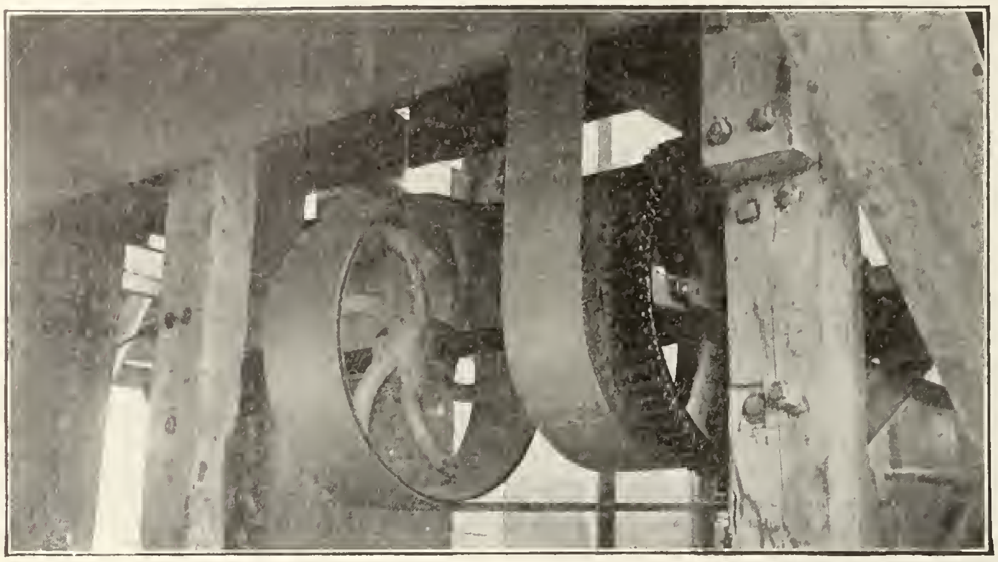
So that you can look into the matter, kindly send for our handsome book of designs and price list.

The Metal Shingle & Siding Company, Limited

Preston, Ontario

Branch Office and Factory—Montreal

SCANDINAVIA BELTING



These belts have been running outdoors for several years, subject to the dust, weather, etc.

OUR PRICES
ARE RIGHT

FEDERAL ENGINEERING & SUPPLIES, LIMITED

Head Office, 284 Yonge Street, Toronto
Branch Office, 329 St. James Street, Montreal

THEW SHOVELS

STEAM SHOVELS
THEW
HORIZONTAL CROWDING MOTION
LORAIN
FULL CIRCLE SWING

The THEW SHOVEL has revolutionized the methods employed for cellai excavating, street grading, road construction, and light contract work in general

The contractor whose equipment includes one of these light shovels, capable of doing the work of thirty or more laborers and economical if it replaces only four or five men, can underbid the contractor who is not so equipped. He can move a given yardage in a shorter time, at a lower cost, and with less trouble. He is recognized as up-to-date in his methods, is given an opportunity to figure upon the best jobs, and will usually receive the preference, other conditions being equal.

The THEW SHOVEL will handle cuts as shallow as 12 inches and give economical results. It will rip up old macadam and handle rough, stony ground most effectively.

Send for Catalogue. C.R.

THE THEW AUTOMATIC SHOVEL CO., Lorain, Ohio

"PROUDFIT" BINDERS

Absolutely flat opening, gives blank book convenience with loose leaf utility. No metal parts exposed. Book complete with index and 500 sheets 11″ x 10″. $25.00 by express C.O.D. with privilege of inspection.

Business Systems Limited, 52 Spadina Ave. TORONTO, Ontario.

Engines and Boilers

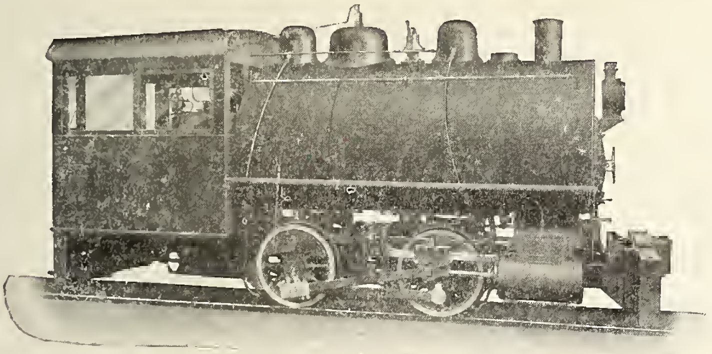
of all types and sizes, Heaters, Tanks, Pumps, etc.

E. Leonard & Sons LONDON ONT.

AGENTS:
MONTREAL ST. JOHN, N. B. WINNIPEG CALGARY VANCOUVER

Agents for **National Gas Engine Co.**
Browett-Lindley Vertical Engines

INDUSTRIAL LOCOMOTIVES



Persistent specialization, careful testing of all materials, and painstaking care in manufacturing, have produced our standard locomotives for contractors, quarries, and switching around mines and industrial plants.

These locomotives are the product of engineers and manufacturers who thoroughly understand conditions surrounding their use. These conditions require powerful and sturdy locomotives which will give maximum work for minimum attention. It is important that the boilers should be ample in capacity, and that they should be tight and remain so. Also that the machinery should be rugged for service with ample surfaces for wear. Parts that will wear should be accessible for easy renewal.

Our standard locomotives embody these features, combined with wide experience. To do yourself justice you should investigate them before purchasing,

Spare parts that are sure to fit are always on hand for prompt shipment.

MONTREAL LOCOMOTIVE WORKS, LIMITED
BANK OF OTTAWA BUILDING, MONTREAL, CANADA

Cumberland County Quarries
Red and Grey Freestone
Oakley Myers, Amherst, N.S.
Hardens with Age. Low Price. Samples and Quotations Free

Crushed Stone, Limited

STONE of any Size and in any Quantity on hand for Sidewalks, Roadwork or Concrete Work

Works :
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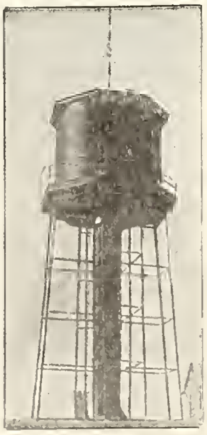
Head Office :
47 Yonge St. Arcade, TORONTO
G. W. ESSERY, Manager



Steel and Wood TANKS

Suitable for Sprinkler Systems Fire Protection, Water Supply Plants, etc.

Steel Substructures of all kinds
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Windmills, Gasoline Engines, Hydraulic Rams, Etc.

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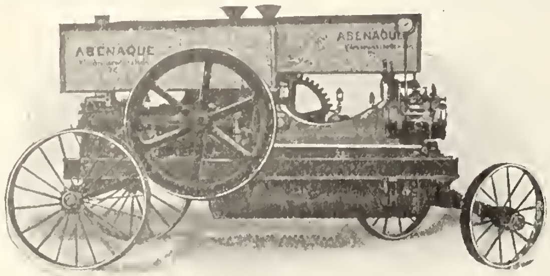

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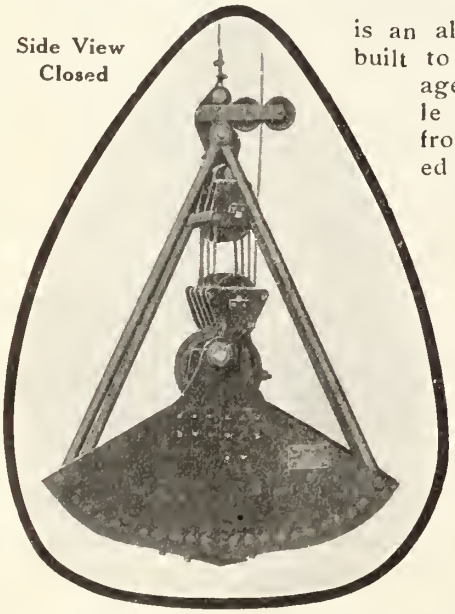

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is an all round bucket, built to stand hard usage. It will handle any material from sand to crushed rock.

The Owen Bucket will dig like a steam shovel and is provided with detachable teeth for dredging.

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For Railway and Bridge Work, Contractors and Builders' Use

Made by practical Jack Builders. Material: best grades of malleable iron and steel Fully guaranteed as to durability and efficiency. The long even stroke of the lever together with the design and careful construction of the jack, makes it the quickest and easiest working lifting appliance on the market. Made in plain and foot-lift styles. Adapted to all classes of work where a lifting jack can be used. Sizes from 8 to 50 tons capacity now complete. Send for prices and discounts.

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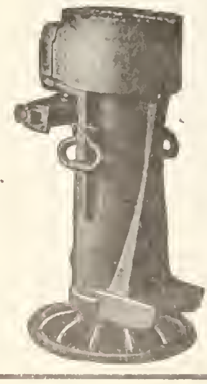

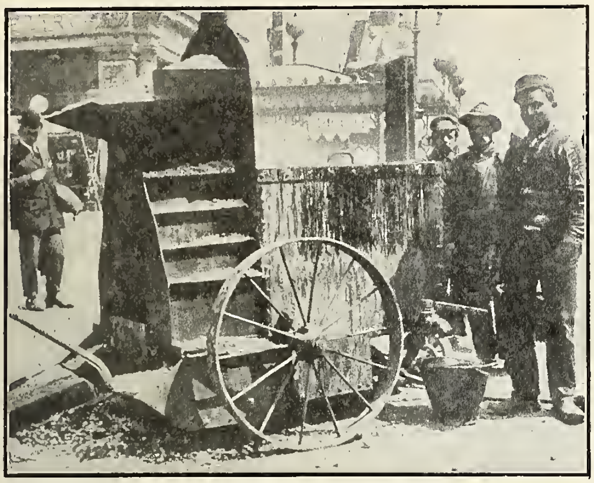

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HARD-WALL PLASTER HAMMER BRAND HILLSBOROUGH, N.B.

It neither loosens nor falls off, it allows carpenters to follow plasterers without loss of time and lasts as long as the building.

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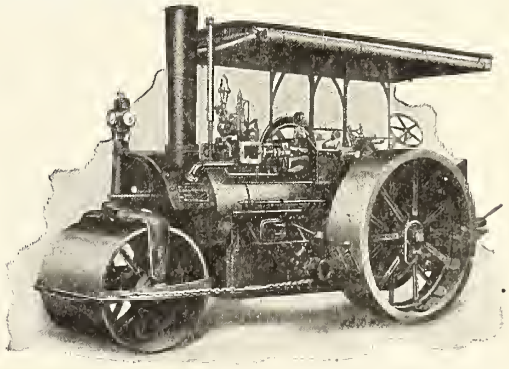

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The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.

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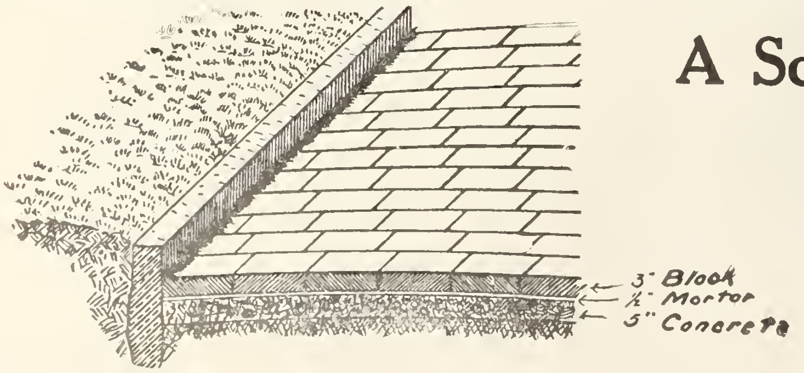

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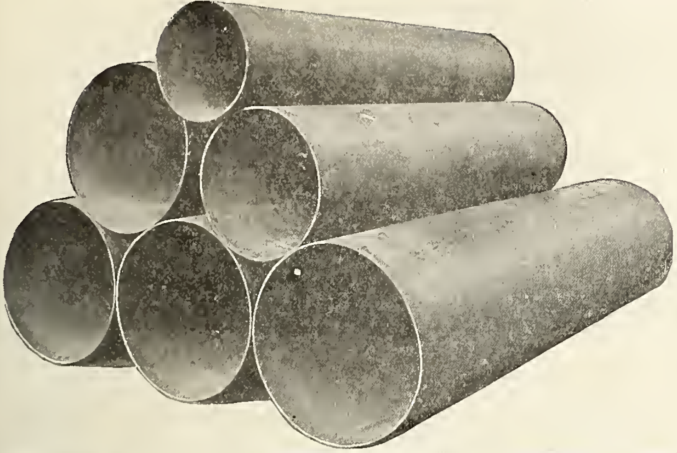

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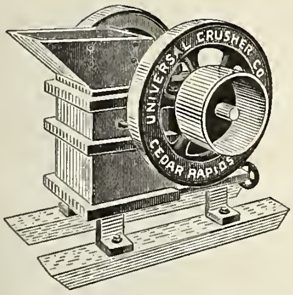
Because of its Forced Feed and Forced Discharge the Universal is SUPERIOR FOR FINE AND UNIFORM CRUSHING To Any Other Machine in the World.



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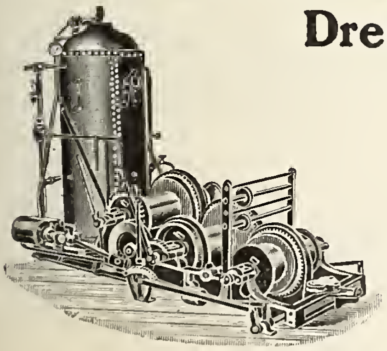

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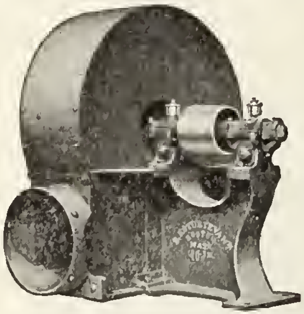

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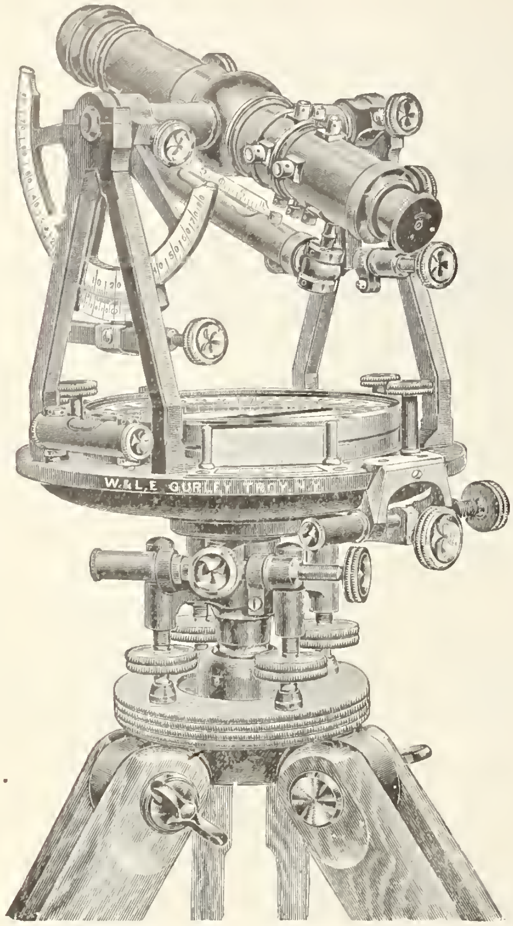
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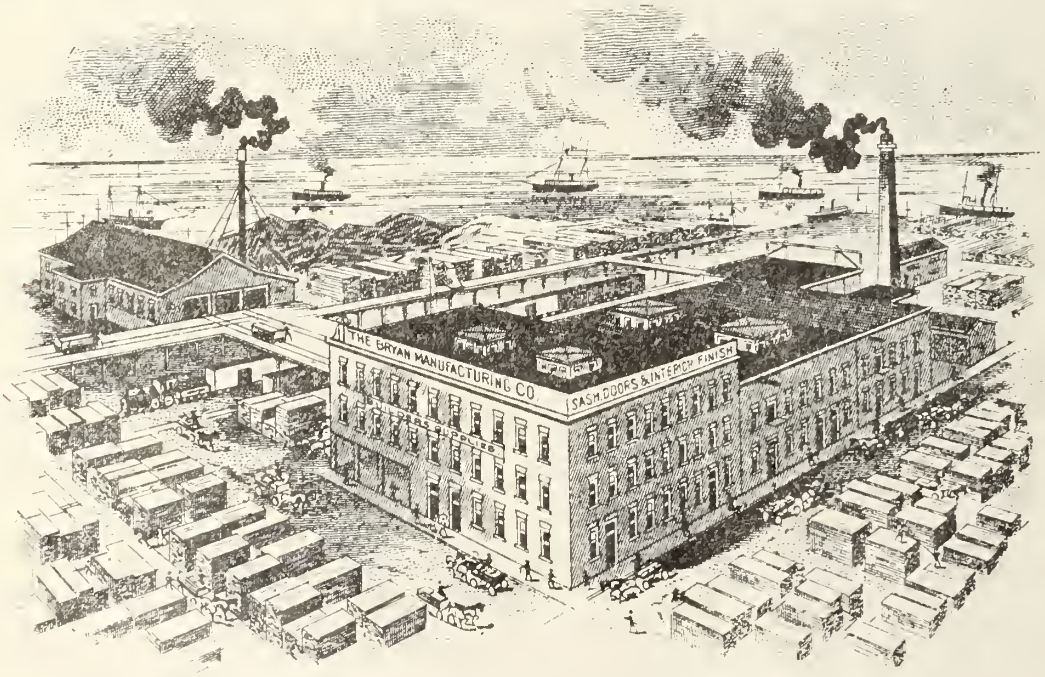

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This is the Brick Machine you should have for the coming season.

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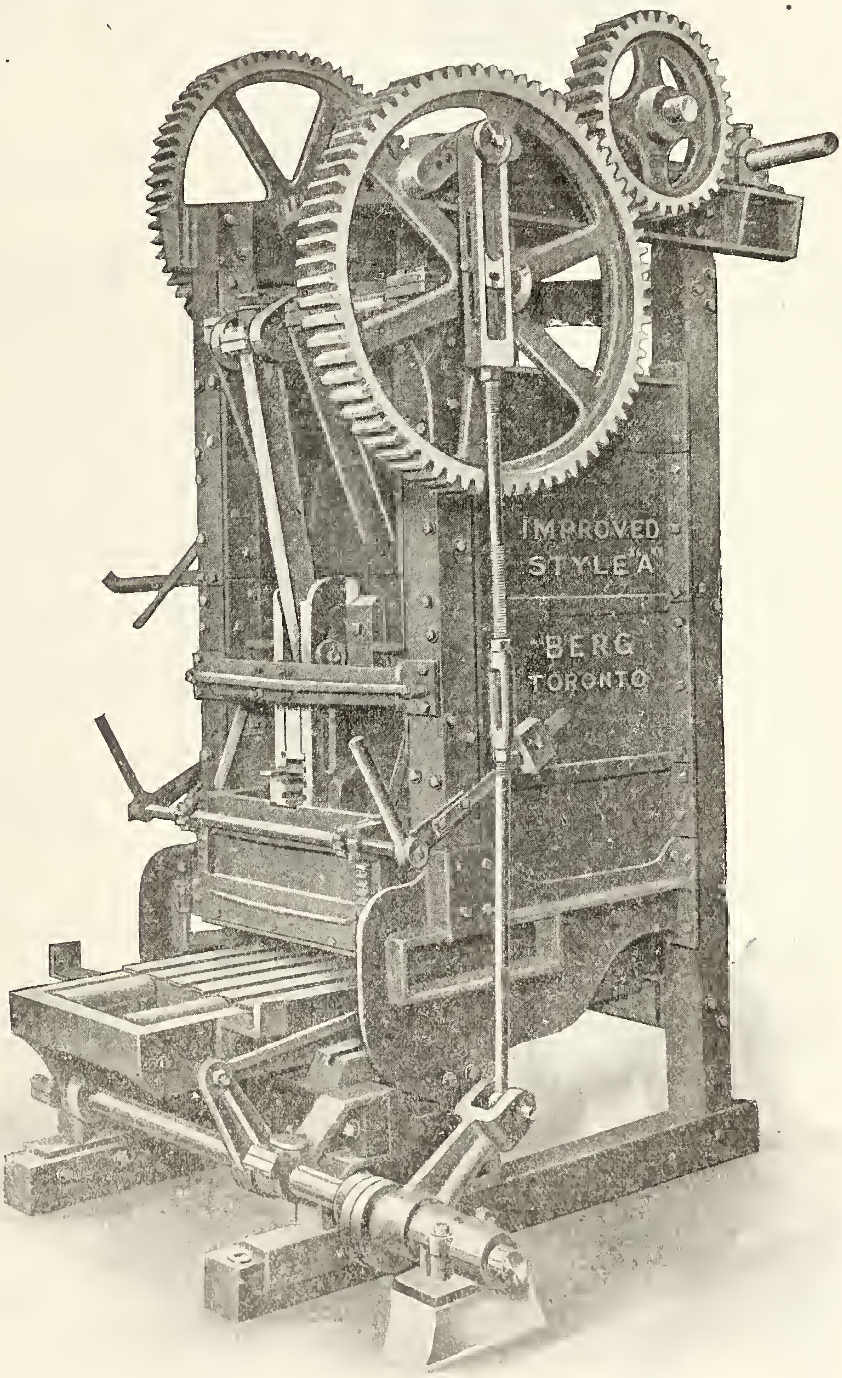
Improved Style "A" Power Brick Machine



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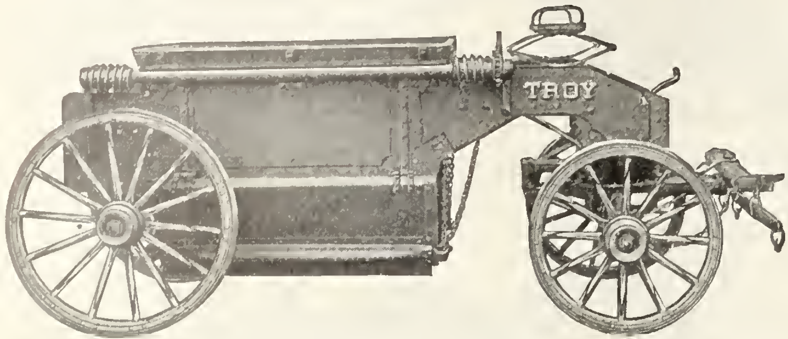

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Use TROY Specials and get your costs down to rock bottom. Your teams can make more trips—the Special is lighter running. Your men can load it quicker—it's lower down. And it never can get out of order. The price is **Right.**

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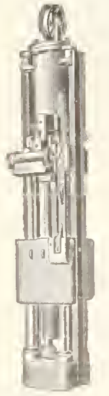
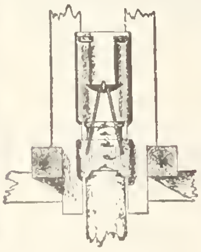


Steam Hammer



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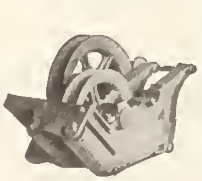
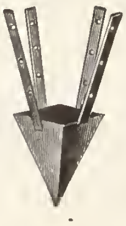


Perfect Head Block



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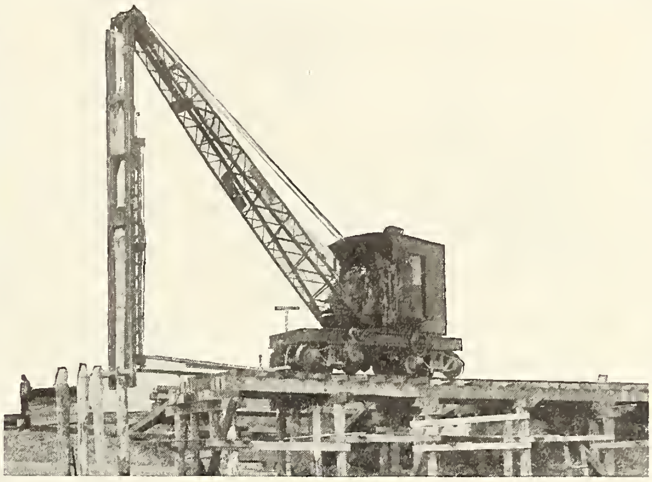

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BROWNHOIST LOCOMOTIVE CRANE

The contractor himself made this device for driving piles with the crane. It was used on the N. Y., C. & St. L. R. R. The piles were 40 ft. long and driven 20 ft.

This is only one of the many uses of a Brownhoist locomotive crane on construction work. It is being used todav for excavating, depositing concrete, handling sand, gravel, stone and heavy construction work, and switching the cars.

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¶ For Roadways and Sidewalks also specially adapted for

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Current Prices of Building Material.

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The following are wholesale prices delivered at Toronto:—

	Per B
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 '	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for oox lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.50	$ 6.75	$ 5.25
40 u. i.	4.25	3.75	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts—Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

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(Installed in Toronto)

Floor Tile—Ceramic, any color, ¾-inch square, 1-inch hex., and 3-16-inch round, 55 cents per square foot up.

Floor Tile—½-inch square, 65 cents.

Wall Tile—Rock faced, sizes 6x2 inch, 2x2 inch; colors, buff, grey, granite, red granite, 55 cents per square foot.

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(per 100 ft.)	Black		Galvanized
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.03	⅜ inch	2.86
½ inch	2.63	½ inch	3.48
¾ inch	3.05	¾ inch	4.28
1 inch	4.37	1 inch	6.02
1¼ inch	5.96	1¼ inch	8.21
1½ inch	7.16	1½ inch	9.86
2 inch	9.18	2 inch	12.78
2½ inch	16.10	2½ inch	21.85
3 inch	21.14	3 inch	28.69
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

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Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

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Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

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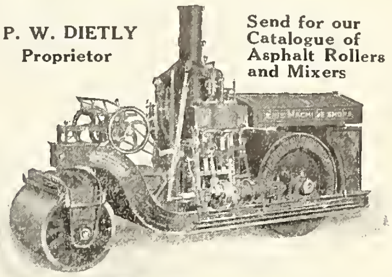

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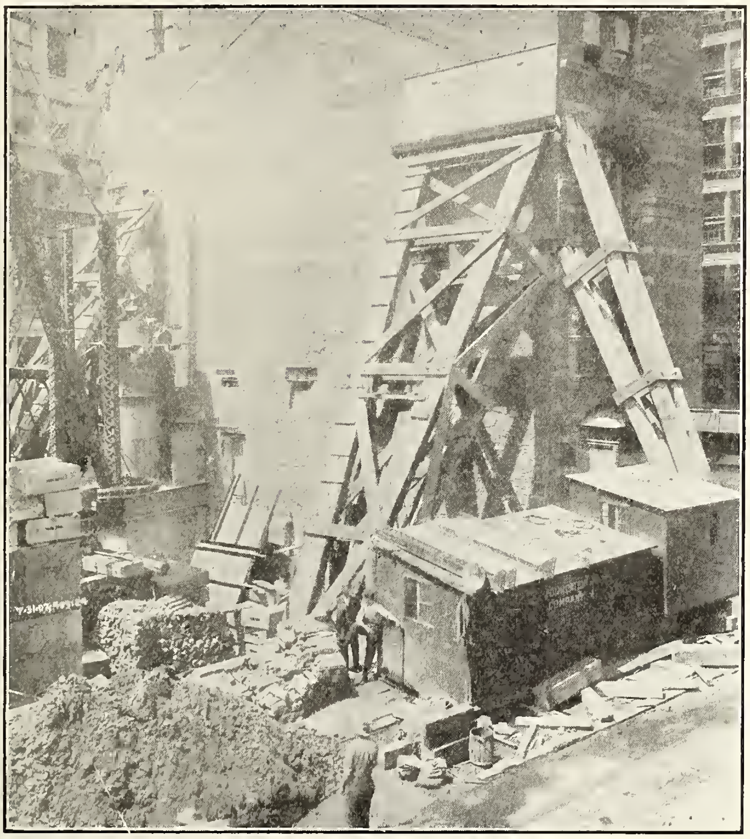

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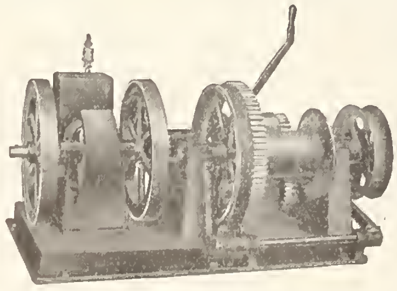

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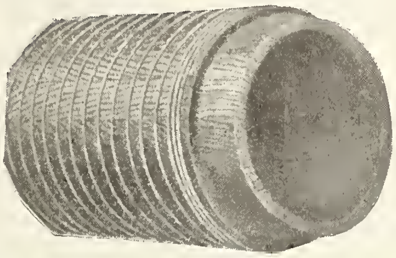

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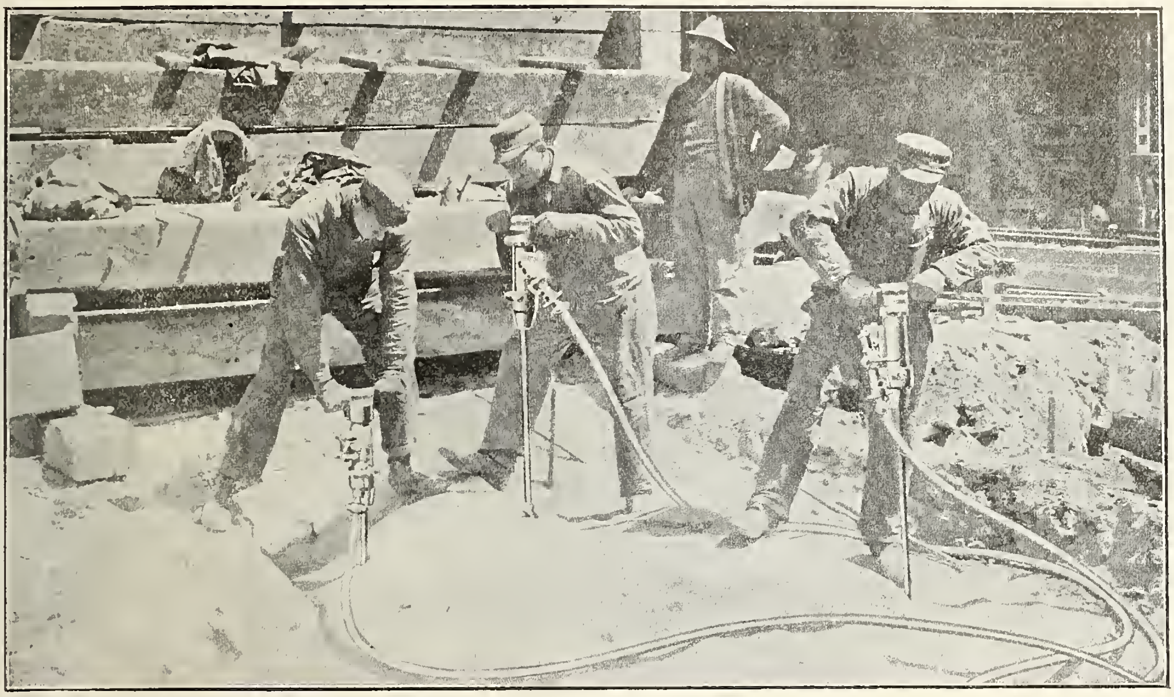

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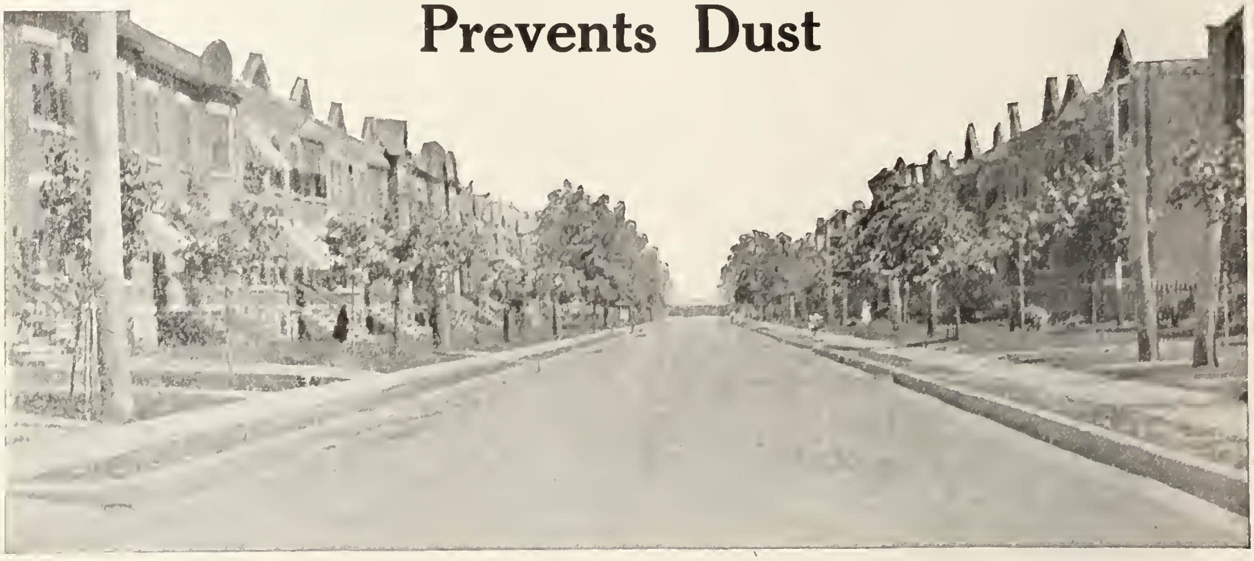

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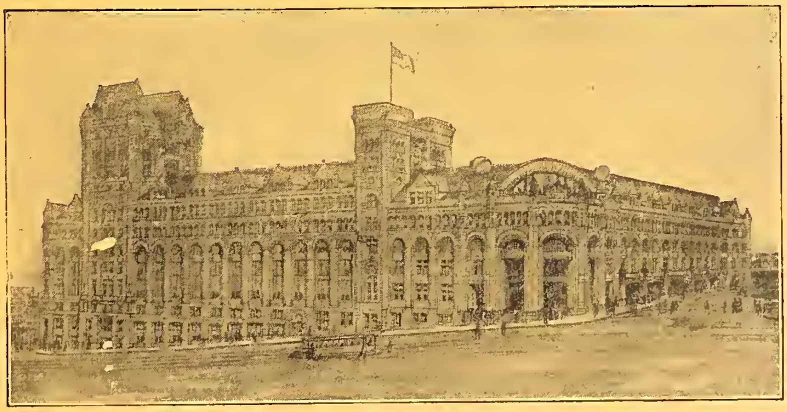

Tunnel under the C. P. R. Depot, Montreal, is built of Ceresitized Concrete.

is an integral waterproofing that is incorporated in the mass of concrete; giving the concrete greater density. Ceresit is a cream white paste that is put in the water used in mixing concrete. The water holds the Ceresit in suspension and in the mixing process Ceresit having an affinity for cement is uniformly distributed throughout the entire concrete mass, carrying its water repellant properties through and through. No matter whether the wall be six inches or six feet thick Ceresit waterproofs the entire width and the entire height of the wall. It is impossible for water to penetrate even the surface of a Ceresitized Concrete Wall.

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Ceresit Waterproofing has been put to practical test for years on every possible sort of waterproofing engineering, both large and small, and it has never failed to do its work.

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Agents Wanted in
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"Davenport"

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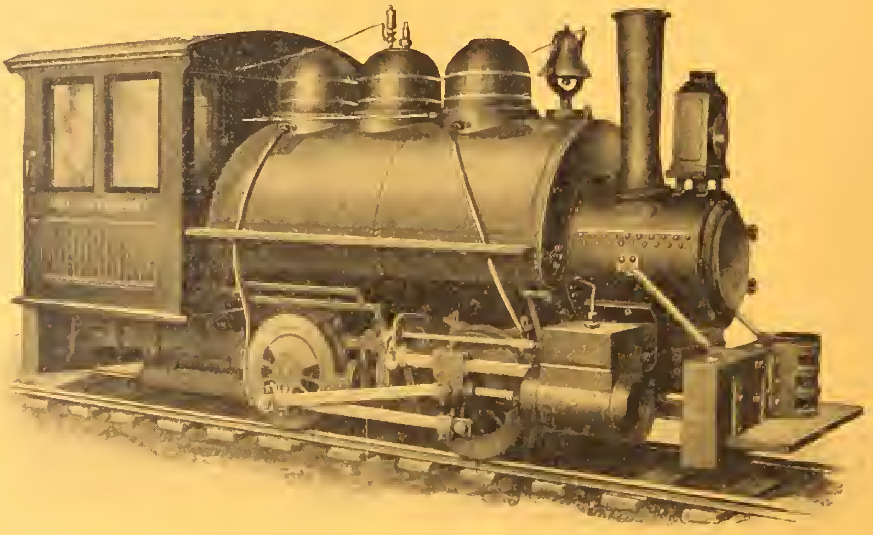

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Supplied in any size and type for various gauges of track.

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are stronger—longer running—safer cars—cars that will do work cheaper than any other make to be obtained. Let us tell you why—

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Design and Construction of Toronto Filtration Plant

ESTABLISHED 1886

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We manufacture
Steam and Power Pumps, Condensers,
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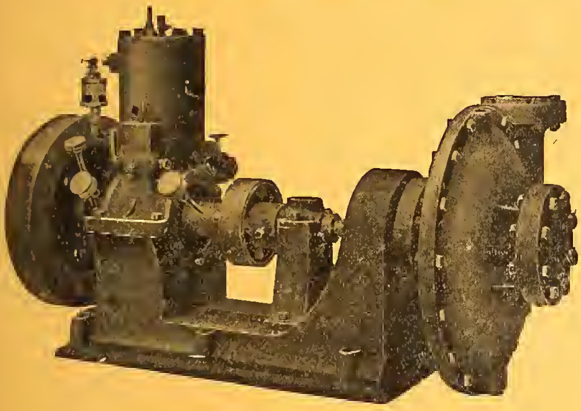

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Bent Glass

Made in all Kinds of Glass on Short Notice

Large Bent Plate Glass for Shop Fronts a Specialty

The Toronto Plate Glass Importing Company, Limited
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Send us your Orders
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BAR STEEL

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Prompt Shipment from Stock

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Continuous and Machine Banded Wood Stave

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for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

Pacific Coast Pipe Co., Limited
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Office and Factory, Granville St., near High Bridge
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Full Particulars and Estimates Furnished

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Horizontal Tubular Boilers

Built for any Working Pressure Desired

WE CARRY IN STOCK A COMPLETE RANGE OF SIZES

Also Vertical and Locomotive Types.

Price on Application

Write our Nearest Sales Office.

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The Jenckes Machine Co., Limited

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Scraper Dredge

Installed at Centerville Lake, Minn. handled material at a cost of less than

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From report of Commissioner of Public Works, St. Paul, Minn.

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Earn Immense Profits

Write us for Suggestions and Information

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Please send prices and information on "AMERICAN" Equipment. State whether Engines, Derricks, etc.
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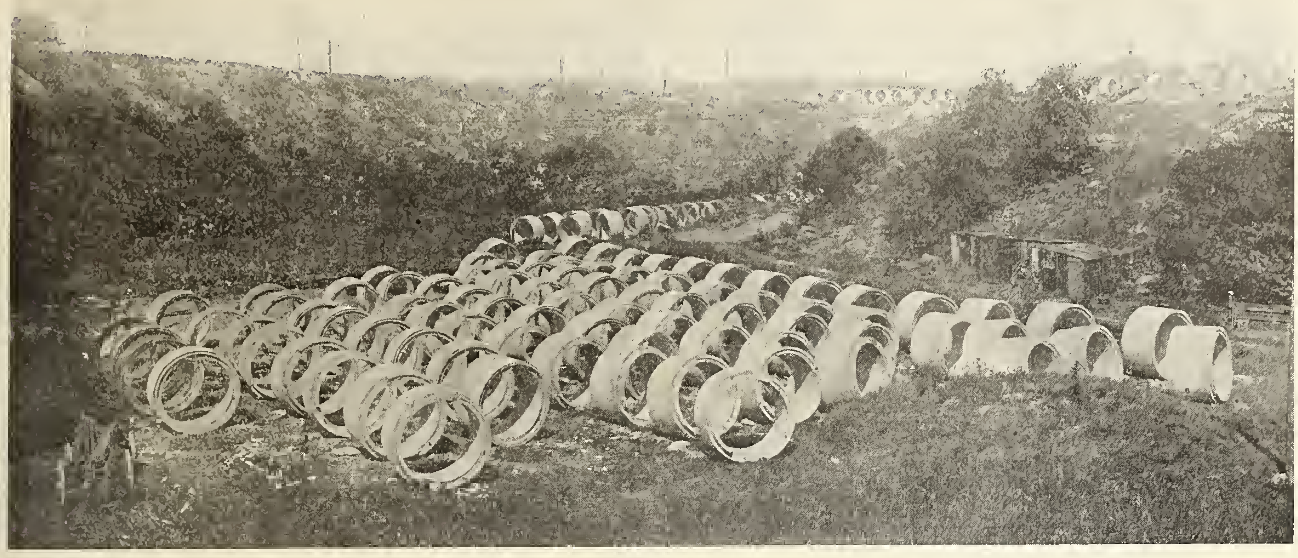
C. R.



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If It Passes Our Tests, It Will Meet Your Needs

There is no longer any question about the suitability of concrete for the making of sewer pipes, drains or any work that has to withstand the corrosive effects of acids or the damages inflicted by frost and water.

Reinforced concrete, **properly made,** has been successful in the most rigid tests and is now the recognized material for all important work.

Properly made concrete, means, not only thoroughly mixed and the right proportions of cement, aggregate and sand—it also means that the cement used, be of the highest standard of purity.

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THE REINFORCED CONCRETE PIPE CO., report that although they have, on one piece of work, used cement from no less than five of our mills, they could see no difference in the quality of the cement or in the work produced. That is what the "Canada" Brand stands for:–absolute purity and absolute uniformity.

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That You Will Increase Your Profits

All you have to do is to take advantage of the experience successful contractors. Modern Money Making Equipment is o of the Prime Essentials.

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have made profits for others and they can do the same for y

They are made right, they work right and they last.

ECONOMY SPEED—DURABILITY—All combined and your disposal.

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Toronto, 73 Victoria St.
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MUSSENS

Right on the Job
All The Time

hat's the record that has made the reputation
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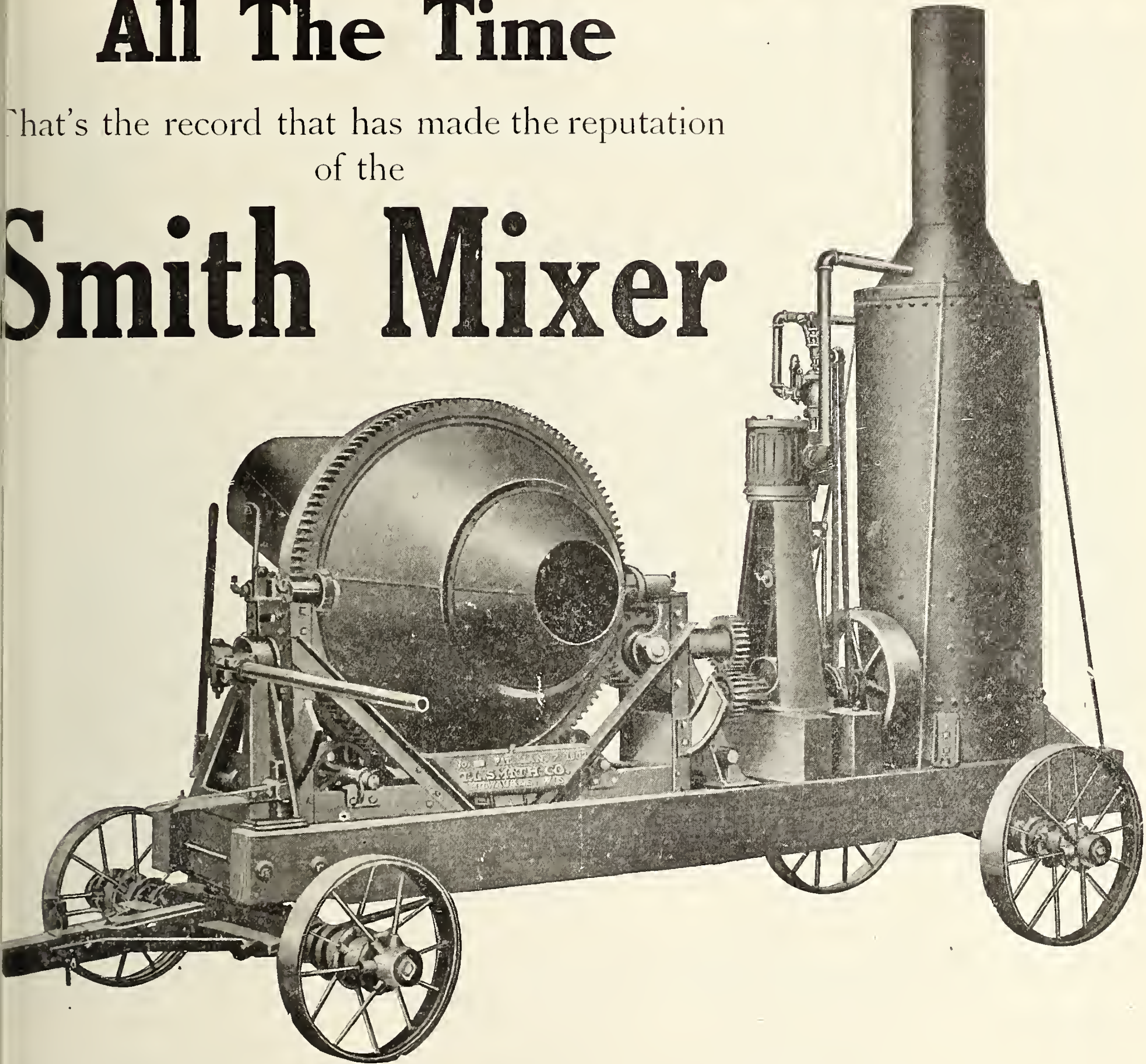
Smith Mixer



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FLEXIBLE SPOUTING

LIMITED

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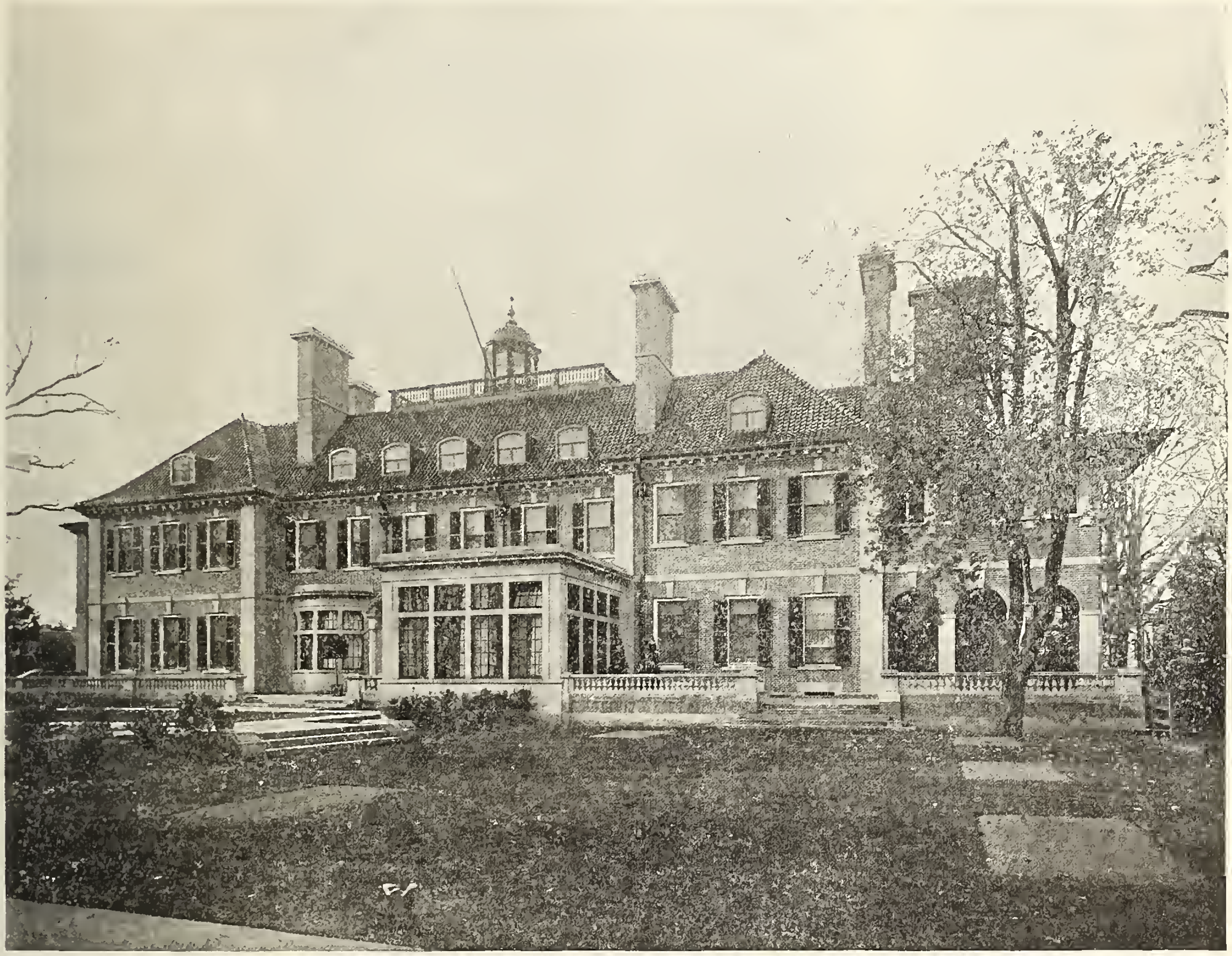
(Continued on page 12)

DON VALLEY BRICKS



Residence of Mr. J. C. Eaton, Toronto. **Messrs. Wickson & Gregg, Architects**

Don Valley Porous Terra Cotta Fire Proofing, Foundation Bricks, Facing Bricks and Enameled Bricks Exclusively Were Used in This Structure

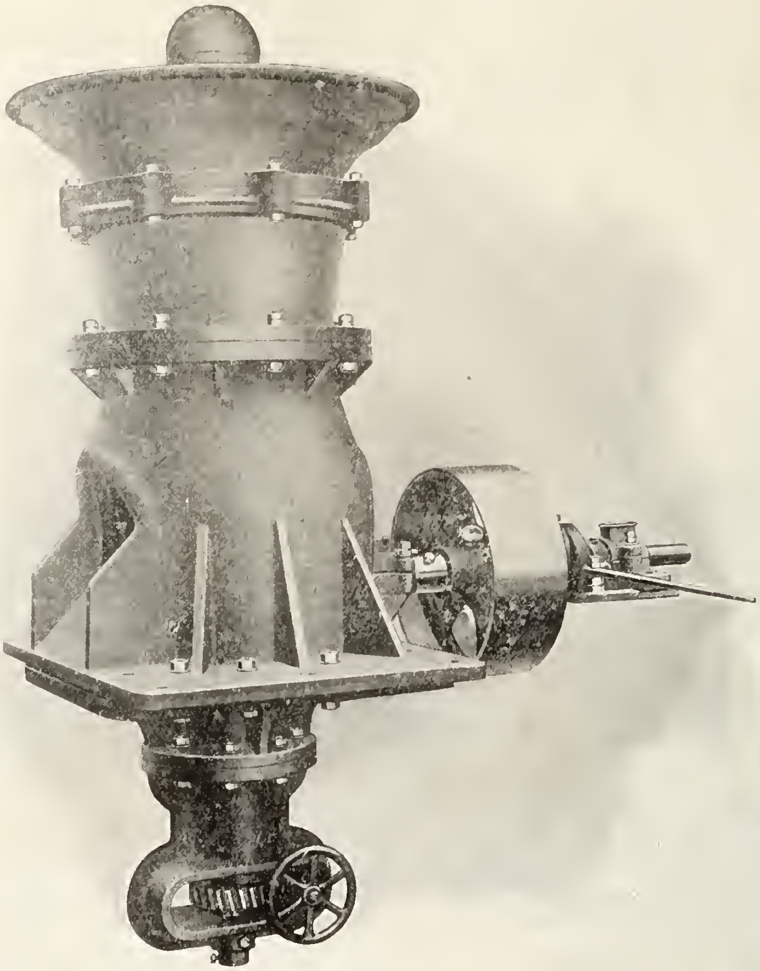
¶ These bricks have been the unanimous choice of discriminating architects and owners in competition with samples submitted by the leading brick firms of Canada and the United States. They are the only thoroughly vitrified facing bricks ever manufactured in the Dominion, and the most exclusive high-class pressed brick on the American continent.

¶ The above view is an illustration of one of the many important buildings in which this product is used.

THE DON VALLEY BRICK WORKS

Head Office: 36 Toronto St., TORONTO

Montreal Agent: **David McGill, 83 Bleury Street**



The

"Goodwin"

(GYRATORY)

Stone Breaker

for large centralized plants is built in two types—Ordinary and Special Adjustable. The latter has features in its wide range of adjustment which no other machine possesses.

The "Goodwin" is designed along down-to-the-minute lines and is especially adapted to the heaviest continuous service with minimum repairs and attendant delays.

And, moreover, the prices are right. GET THEM.

The Ford Iron Company, Limited

MONTREAL

Everything for Crushed Stone Work Everything for Concrete Mixing and Laying

Rogers' Cement

THE Rogers Brands of Portland Cement are carefully *standardized* to an exact formula, that each brand may *always* give the same high and *regular standard* of strength, *regular* period of setting, and *regular binding* qualities for thin mixtures. It is wise to *specify* Rogers Brands on all important concrete construction. The architect benefits in the *finish* and *stability* of the finished structure. The contractor benefits in the *uuiformity* and *rapidity* of set. The mills embraced in the Rogers organization are conveniently located for *prompt* shipment at *low freight cost,* and *reserve stock* is available for *emergency* shipments.

The *Service* of the Rogers organization bears no small relation to actually making the use of Rogers Brands of Portland Cement the most *economical* and *profitable* product for construction undertakings of every type in which Portland Cement is to be largely used.

Our Mills are located at Atwood, Durham, Hanover
Kirkfield, Orangeville, Owen Sound and Wiarton

Alfred Rogers, Limited

28 West King Street, TORONTO
W. J. Dineen & Co., Western Sales Managers, Winnipeg

5

Wettlaufer Heart-Shaped Mixers

Test After Test Has Proved their Efficiency

This Wettlaufer Mixer on Streets of Brandon, Man., has turned out over 16,000 cubic yards of concrete. (Bangham & Gale, Contractors.)

¶ Wettlaufer Heart-Shaped Mixers have won a reputation both for the quality and quantity of their output.

¶ Paving Contractors using one of our half yard mixers have laid an average of 450 running feet of five foot sidewalk per nine hour day with only nine men on the job.

¶ But the machine which we specially recommend for road work is our **NEW IMPROVED ½ OR ¾-YARD HEART-SHAPED TRACTION MIXER.**

¶ This machine is built with the dumping device discharging from the back end or side of the mixer, and automatic lift hopper on the front of the mixer. It is also equipped with our new watering system, which makes the concrete uniform.

¶ You may traction this mixer up the road at the same time as the concrete is being discharged from the drum. One man operates this machine from the one position.

DEMONSTRATIONS GIVEN ANY TIME AT OUR WAREROOMS

WETTLAUFER BROS.

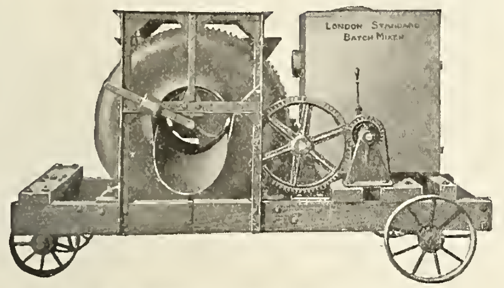
Head Office and Warerooms

178 Spadina Avenue ∴ ∴ TORONTO

BRANCH OFFICES:

A. R. Williams Machinery Co., 15 Dock St., St. John, N.B.; Princess St., Winnipeg
Factories: Mitchell, Ont.; Buffalo, N.Y.; Detroit, Mich.

London Standard Batch Mixers



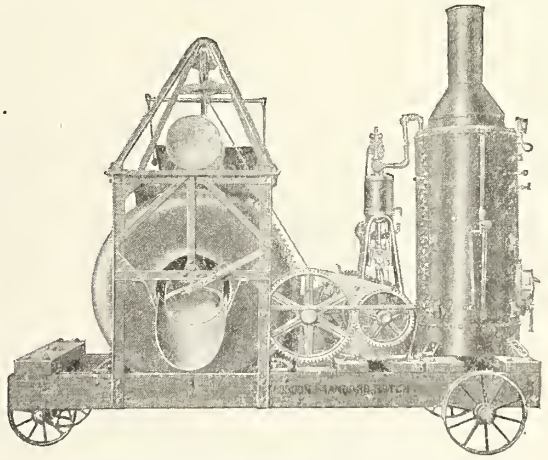
London Standard Drum Batch Mixer No. 1
Equipped with Gasoline Engine

The London Standard Drum Batch Mixers are made in four sizes, namely, one-third yard, one-half yard and one yard batches and are furnished with any equipment.

The many new and improved features of the London Standard Drum Batch Mixers appeal to every contractor desiring a mixer of this type. **We can give you the best value for your money** of any firm doing business, **because** we manufacture only Concrete Machinery, and on this account we can sell you a machine at very much less cost than Firms who do not manufacture their own machines but handle a concrete mixer along with other lines of goods.

We also manufacture—

Face-Down Block Machines
Cement Brick Machines
Power Cement Drain Tile Machines
Hand Cement Drain Tile Machines
Sewer Pipe Molds
Ornamental Molds
Silo Curbs
Adjustable Sill, Step and Window
Cap Molds
Friction Hoists
And a full line of
Cement Working Tools



London Standard Drum Batch Mixer No. 2 equipped with Steam Engine and Loading Skip

We are the largest manufacturers of Concrete Machinery in Canada, and can meet every requirement of the Contractor in the line of Concrete Machinery at the lowest possible cost. Tell us your requirements.

London Concrete Machinery Co. Limited

19 Marmora St., LONDON, CANADA

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CLASSIFIED INDEX TO ADVERTISEMENTS—Continued

(Continued from page 6)

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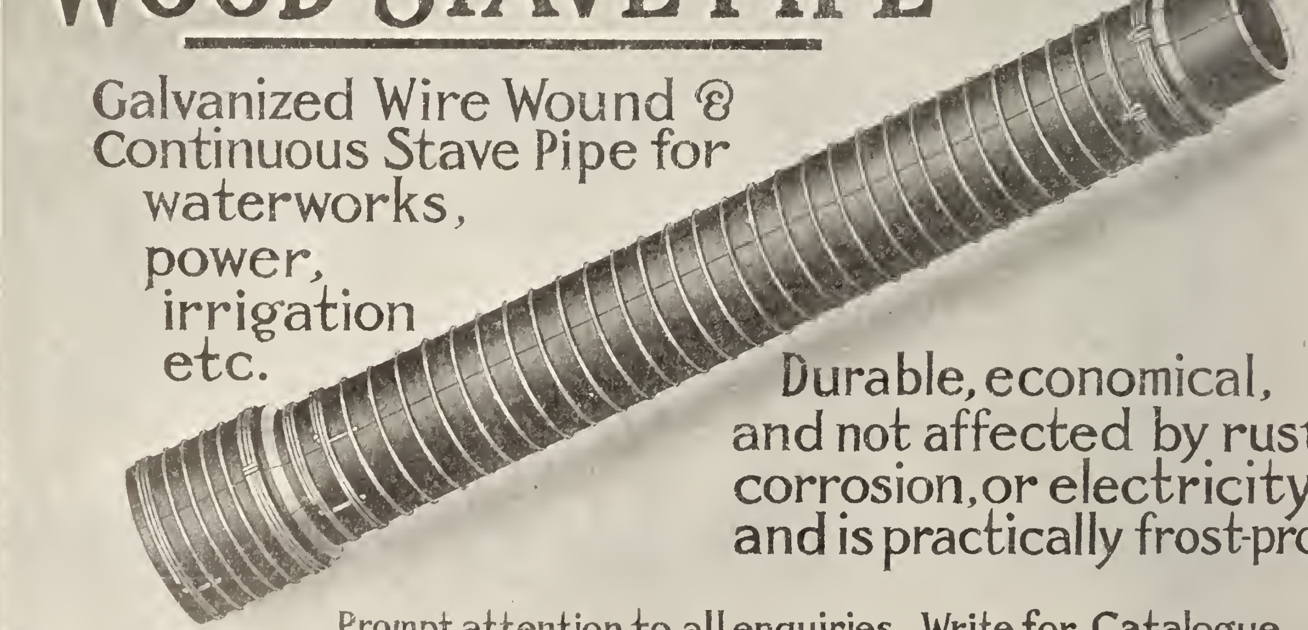

WOOD STAVE PIPE

Galvanized Wire Wound &
Continuous Stave Pipe for
waterworks,
power,
irrigation
etc.

Durable, economical,
and not affected by rust,
corrosion, or electricity,
and is practically frost-proof.

Prompt attention to all enquiries. Write for Catalogue.

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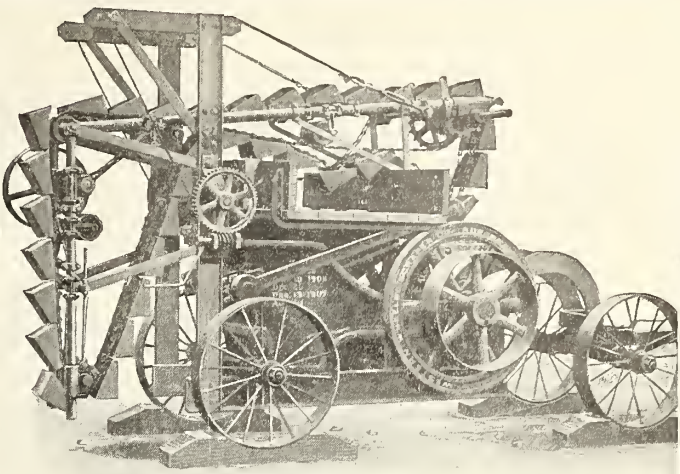

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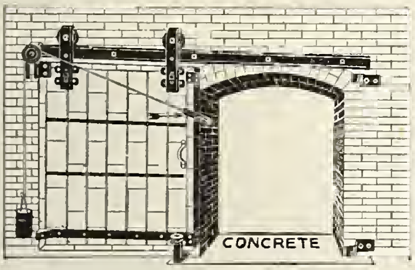

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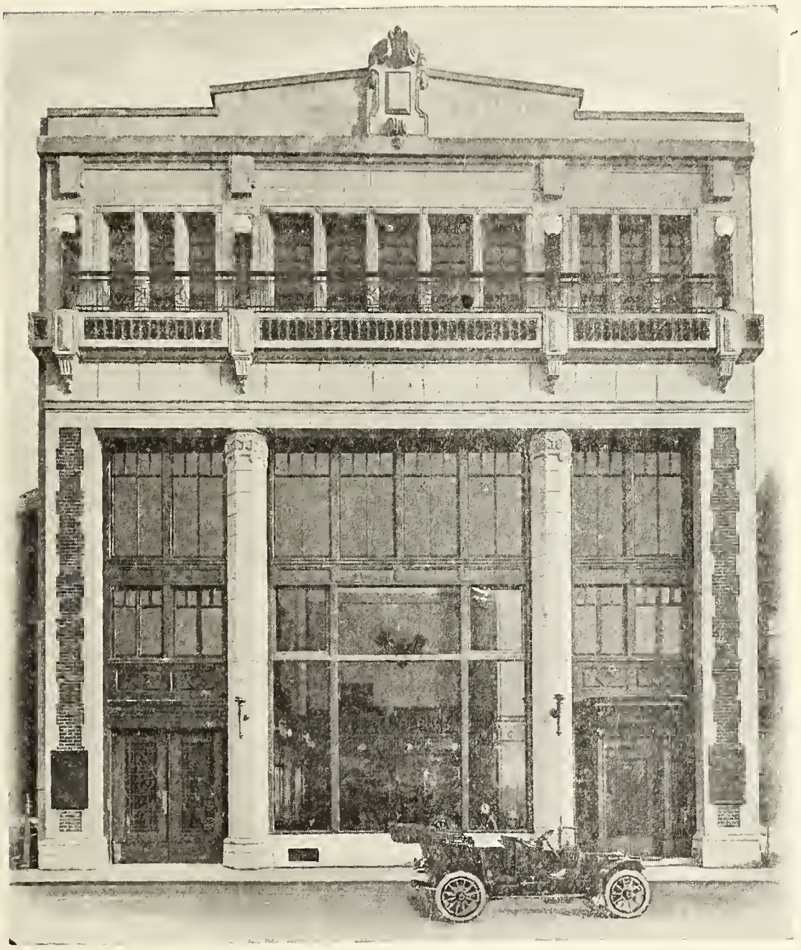

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ALPHABETICAL LIST OF ADVERTISERS

Abenaque Machine Works	92
Acme Equipment & Engineering Co.	82
Ainsworth & Sons, Wm.	27
Albert Manufacturing Co.	
Alsen's American Portland Cement Wks.	90
Ambursen Hydraulic Construction Co. of Canada, Limited	27
American Enameled Brick & Tile Co.	94
American Hoist & Derrick Co.	2
American Water Softener Co.	92
American Spiral Pipe Works	91
American Well Works	108
Anderson & Co., 1905 Ltd. George	22
Andresen, H. P.	
Bain & Ross	104
Bates & Edmonds Motor Co.	106
Batts Limited	
Beatty & Sons, Limited, M.	91
Beckman Company, Limited	97
Bell Filtration Co. of Canada, Ltd.	31
Bennett, Robert	
Berg Manufacturing Company	
Blystone Manufacturing Company	93
Bowman & Connor	104
Bremner Limited, Alex.	103
Brennen & Sons Mfg. Co., Ltd., M.	82
Britnell & Co., Ltd.	98
Brodie & Company, James	85
Brown Hoisting Machinery Co.	95
Browning Engineering Company	
Buffalo Meter Company	
Business Systems Limited	87
Bryan Manufacturing Company	
Canada Cement Co., Ltd.	3
Canada Foundry Co., Ltd.	20-79-109
Canada Iron Corporation Limited	103
Canada Steel Company	92
Canada Wire & Cable Co.	106
Canada Wire & Iron Goods Co.	88
Canadian Boving Company	30
Canadian Bridge Co., Ltd.	100
Canadian Fairbanks-Morse Co., Ltd.	22
Canadian Kellogg Company	35
Canadian Office and School Furniture Company, Limited	99
Canadian Norcross Bros. Co.	18
Canadian Pipe Co., Ltd.	102
Canadian Rand Co., Ltd.	84
Canadian Supply Company	
Carey Mfg. Co., Philip	85
Cement Era Publishing Co.	85
Ceresit Waterproofing Company	
Chipman & Power	104
Christie Henderson & Co.	98
Cleveland Bridge & Engineering Co., Ltd.	100
Cloisonne Glass Co. of Canada	
Colonial Ornamental Glass Co.	88
Cook, A. D.	80
Commercial, The	99
Conduits Company, Limited	103
Consolidated Glass Company	88
Consolidated Optical Co., Ltd.	96
Consolidated Stone Co.	85
Consumers' Gas Company	80
Contractors' Supply Co., Ltd.	98
Crushed Stone Limited	87
Corinthian Stone Co.	24
Dahlstrom Metallic Door Co.	
Dennis Wire & Iron Works Co., Ltd.	102
Des Moines Bridge & Iron Co.	91
Dickson Bridge Works Co., Ltd.	100
Doolittle & Wilcox Limited	103
Dominion Bridge Co., Limited	100
Dominion Creosoting Company	105
Dominion Marble Co., Ltd.	21
Dominion Sewer Pipe Co., Ltd.	21
Dominion Wood Pipe Co., Limited	10
Don Valley Brick Works	7
Down Draft Furnace Company	34
Eadie-Douglas Limited	
East Iron & Machine Company	90
Eastern Pipe & Construction Co., Ltd.	34
Eaton & Company, T.	97
Eaton & Sons, Ltd., J. R.	94
Erie Machine Shops	88
Factory Products Limited	35
Farmer, John T.	104
Ferguson, H. S.	104
Ford Iron Company, Limited	8
Foundation Company	
Fuce, Edward O.	104
Galt Art Metal Co., Limited	86
Galt Engineering Co., John	104
Gartshore, John J.	104
Gartshore-Thompson Pipe & Foundry Co., Ltd.	102
General Machinery Co., Ltd.	
Georgian Bay Shook Mills, Ltd.	
Gibb, Alexander	97
Goodyear Tire & Rubber Co. of Canada, Ltd.	33
Greening Wire Co., Ltd., B.	29
Guarantee Company of North America	104
Gurley, W. & L. E.	96
Hagerville Contracting Co., Ltd.	13
Hamilton Machinery Co., Ltd.	26
Hamilton Pressed Brick Co.	
Hancock, Jr., H. Syd.	104
Harvey, J.	99
H. & E. Lifting Jack Co.	
Heinicke, Inc., H. R.	
Hepburn, John T.	17
Hobbs Manufacturing Co., Ltd.	88
Holmes & Sons, Fred	
Hopkins & Company, F. H.	112
Hunt & Company, Robert W.	104
Hunter Bridge & Boiler Co., Ltd.	101
Imperial Wire & Cable Co., Ltd.	111
Inglis Company, John	77
International Marine Signal Co., Ltd.	14
Jamieson Lime Company	
Jenckes Machine Company, Limited	2
Johnston, A. H.	21
Johnston & Chapman Company	34
Kennedy, James C.	104
Kerr Engine Company, Limited	23
Laurentian Granite Co., Ltd.	104
Lea, R. S.	104
Leach Concrete Company	
Leonard & Sons, E.	87
Leslie & Co., Ltd., A. C.	1
London Concrete Machinery Co., Ltd.	11
London Gas Power Co., Ltd.	81
Luxfer Prism Company	32
Mace, T. Harry	104
MacKinnon Holmes & Co., Ltd.	
MacLean Daily Reports	93
Marsh & Henthorn Limited	81
McCoy Company, Henry J.	32
McDougall Caledonian Iron Wk.s Co., John	79
McIlwraith, James A.	104
McMillan & Son, W.	
McNally & Co., William	101
Meadows, George B.	35
Metal Shingle & Siding Co.	
Metallic Roofing Co., Ltd.	81
Metropolitan Paving Bricks Co.	80
Miller & Co., George M.	
Milton Pressed Brick Company	29
Mitchell, Chas. H. & Percival H.	104
Mitchell Co., Ltd., Robert	
Missisquoi Marble Co., Ltd.	94
Montreal Locomotive Works, Ltd.	87
Morrison & Co., T. A.	104
Munderloh & Co., Ltd.	13
Mussens Limited	4
Myers, Oakley	87
National Bridge Co. of Canada, Ltd.	101
National Iron Works Ltd.	103
Neptune Meter Co.	25
Noble, Clarence W.	90
Northwestern Terra Cotta Company	95
Ontario Asphalt Block Co., Limited	90
Ontario Lime Association Limited	89
Ontario Sewer Pipe Co., Ltd.	20
Ontario Wind Engine & Pump Co., Ltd.	87
Ormsby, Ltd., A. E.	13
Owen Bucket Co.	92
Pacific Coast Pipe Co., Ltd.	1
Page Wire Fence Co., Ltd.	86
Patterson Manufacturing Company	110
Pedlar People Limited	
Phoenix Bridge & Iron Works, Limited	101
Port Credit Brick Co., Ltd.	102
Power & Son	
"Prime White" Road Oil Co.	107
Pyle-National Electric Headlight Co.	19
Queenstown Quarry Co., Ltd.	103
Reid & Brown	104
Rhodes, Curry Company, Limited	81
"R. I. W." Damp Resisting Paint Co.	19
Rogers, Limited, Alfred	9
Rogers Supply Company	27
Roman Stone Co., Limited	15
Rouleau, Jas. N.	104
Sackville Freestone Co., Ltd.	14
Sand & Supplies, Limited	101
Sarnia Bridge Co., Ltd.	101
Shawmut Vitrified Paving Brick Works	
Smart-Turner Machine Co., Ltd.	1
Smith Limited, Thos. & Wm.	
Smyth & Ryan	98
Standard Drain Pipe Co., Ltd.	21
Standard Foundry & Machine Co.	32
Standard Ideal Co., Ltd.	36
Steel Company of Canada	30
Steel & Radiation, Ltd.	28
Steward, A. P.	86
Stinson-Reeb Builders' Supply Co.	36
Sturtevant, B. F.	93
Taylor, Hogle & Davis	
Taylor, J. & J.	85
Tide Water Iron Works	89
Thew Automatic Shovel Co., The	86
Thompson & Co., B .& S. H.	95
Toronto Furnace & Crematory Co.	
Toronto Plate Glass Importing Co., Ltd.	1-95
Troy Wagon Works Co.	94
Turner, C. A. P.	82
Union Water Meter Co.	25
Universal Crusher Co.	91
Vining Manufacturing Co.	85
Vulcan Iron Works	94
Wadsworth Howland & Co., Inc.	91
Waterous Engine Works Co., Ltd.	89
Watson Wagon Company	
Weeks, Arthur L.	104
Wells & Gray, Ltd.	83
Western Canada Contractor	98
Western Wheeled Scraper Co.	13
Wettlaufer Bros.	10
Whitehead & Co., Ltd., John	111
Wilson Bros., Ltd.	106
Woods Limited	25
Wyss & Co., Escher	
York Sand & Gravel Co.	98

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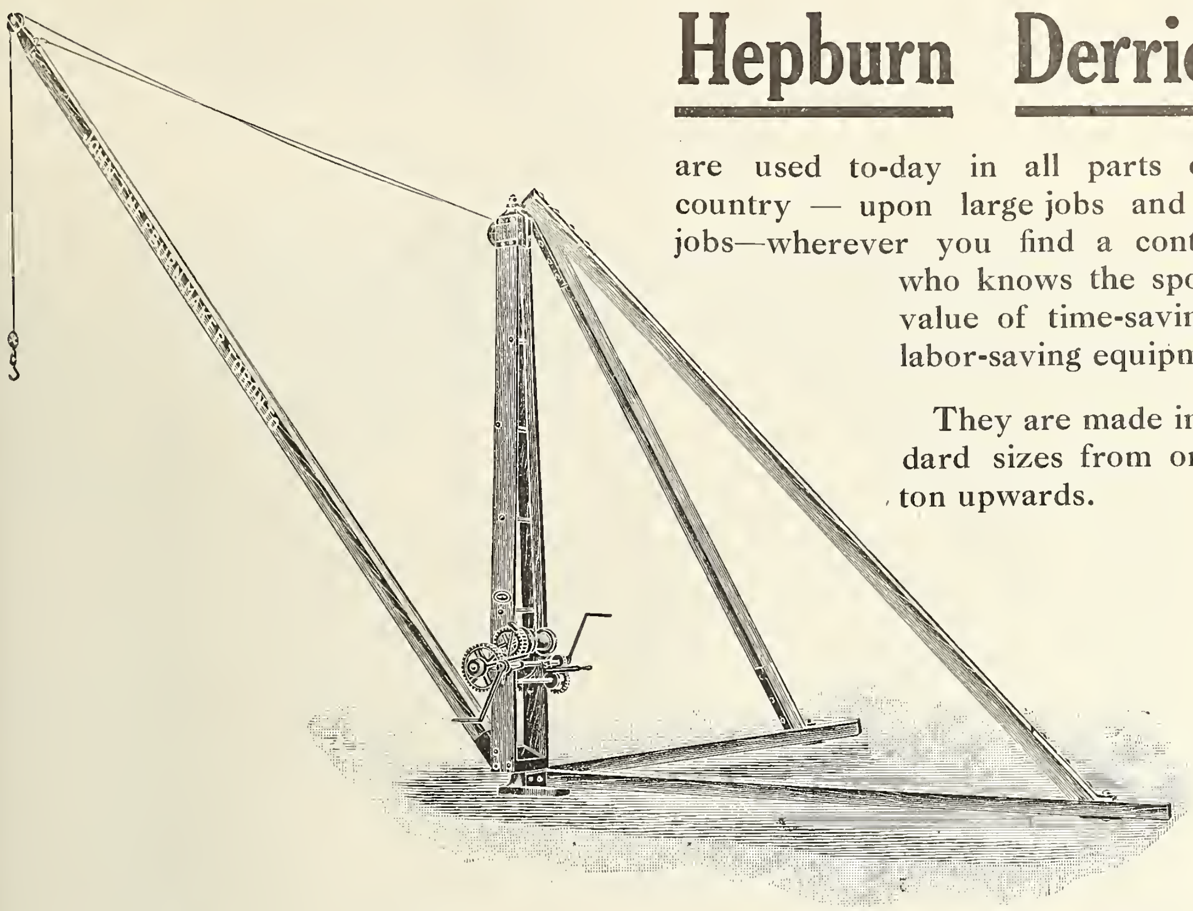
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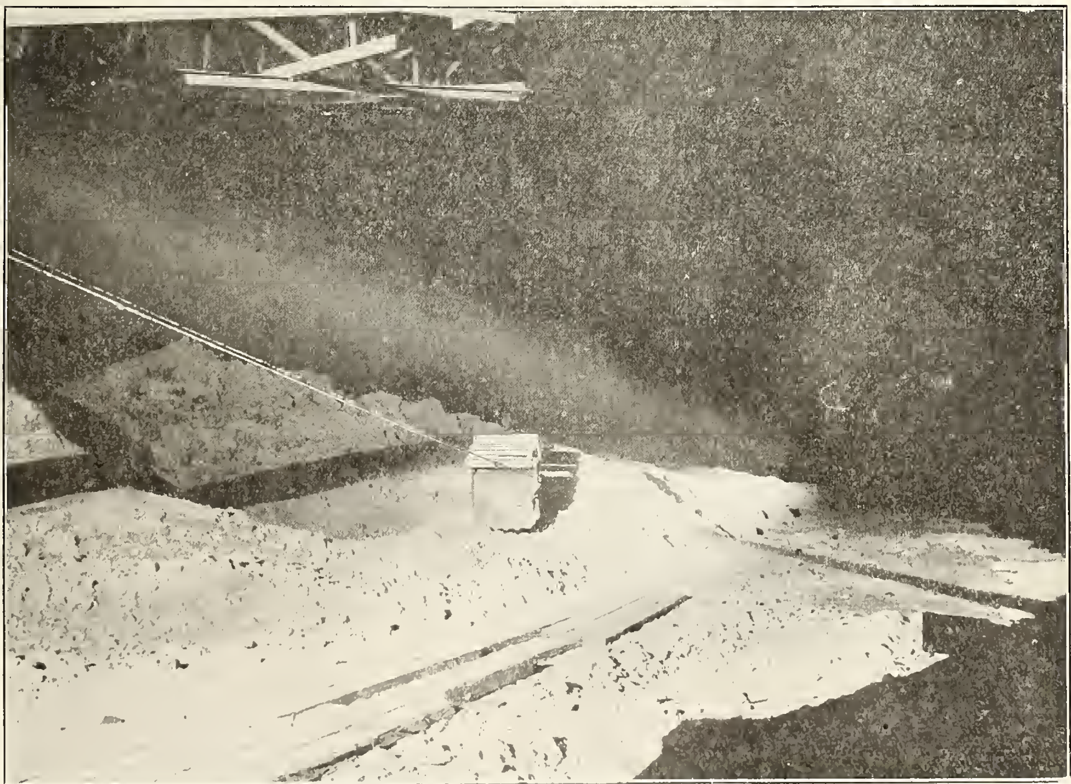

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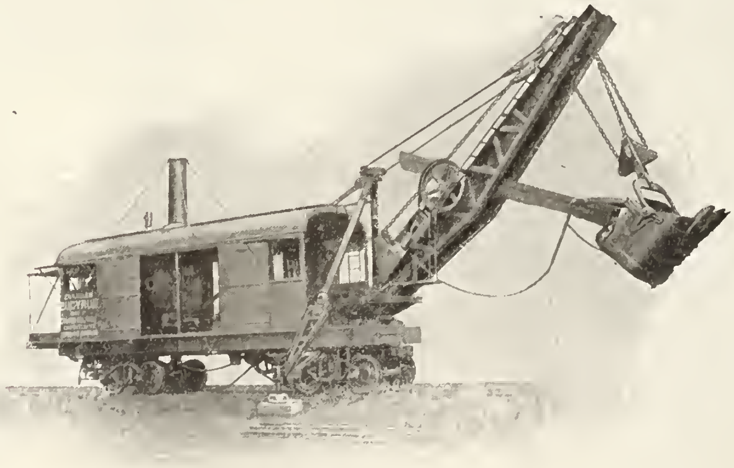

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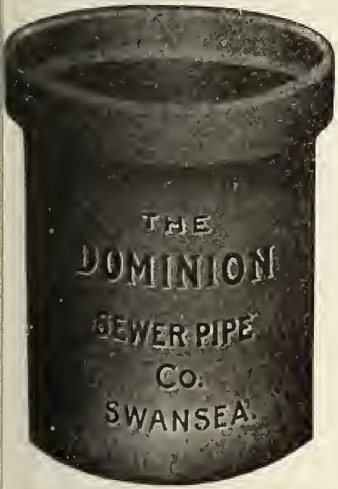

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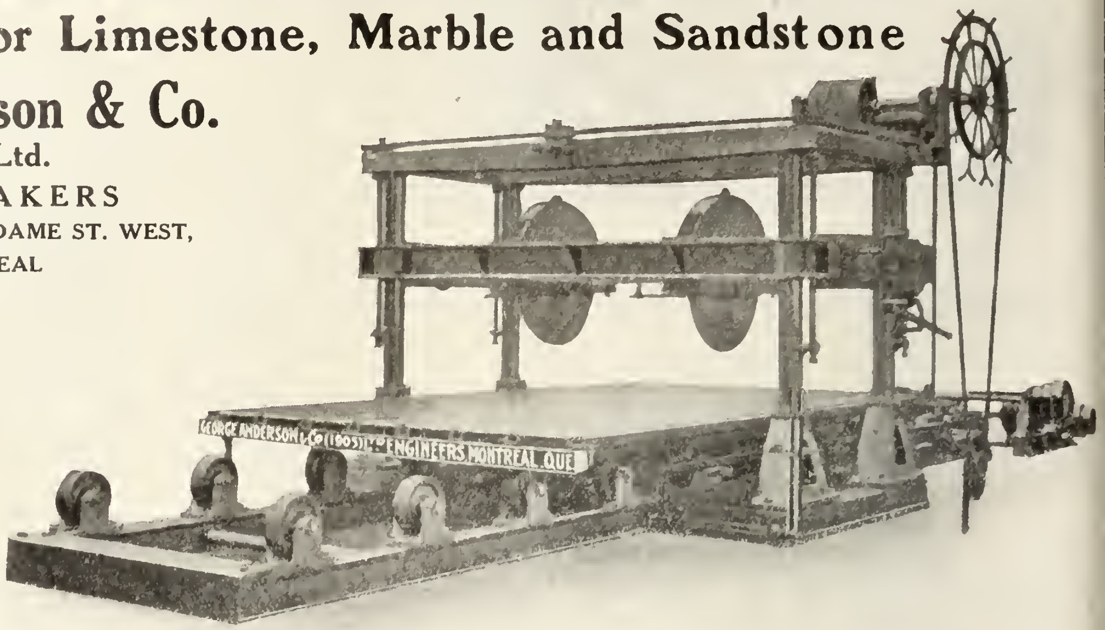

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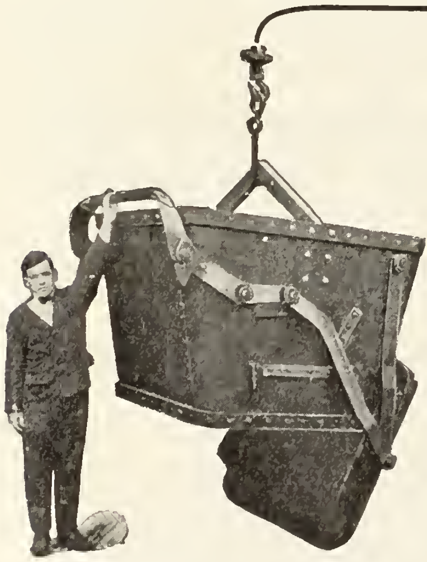

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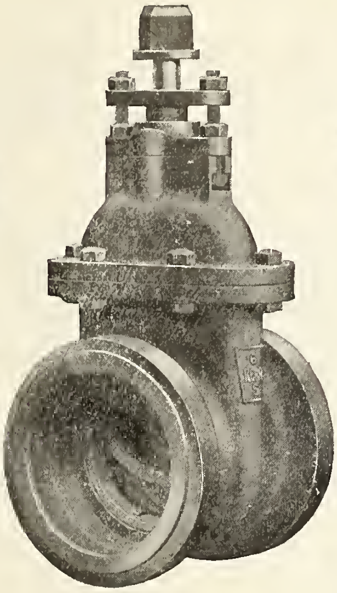

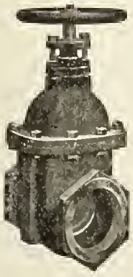

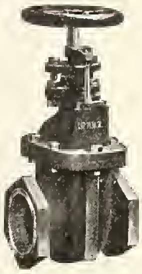

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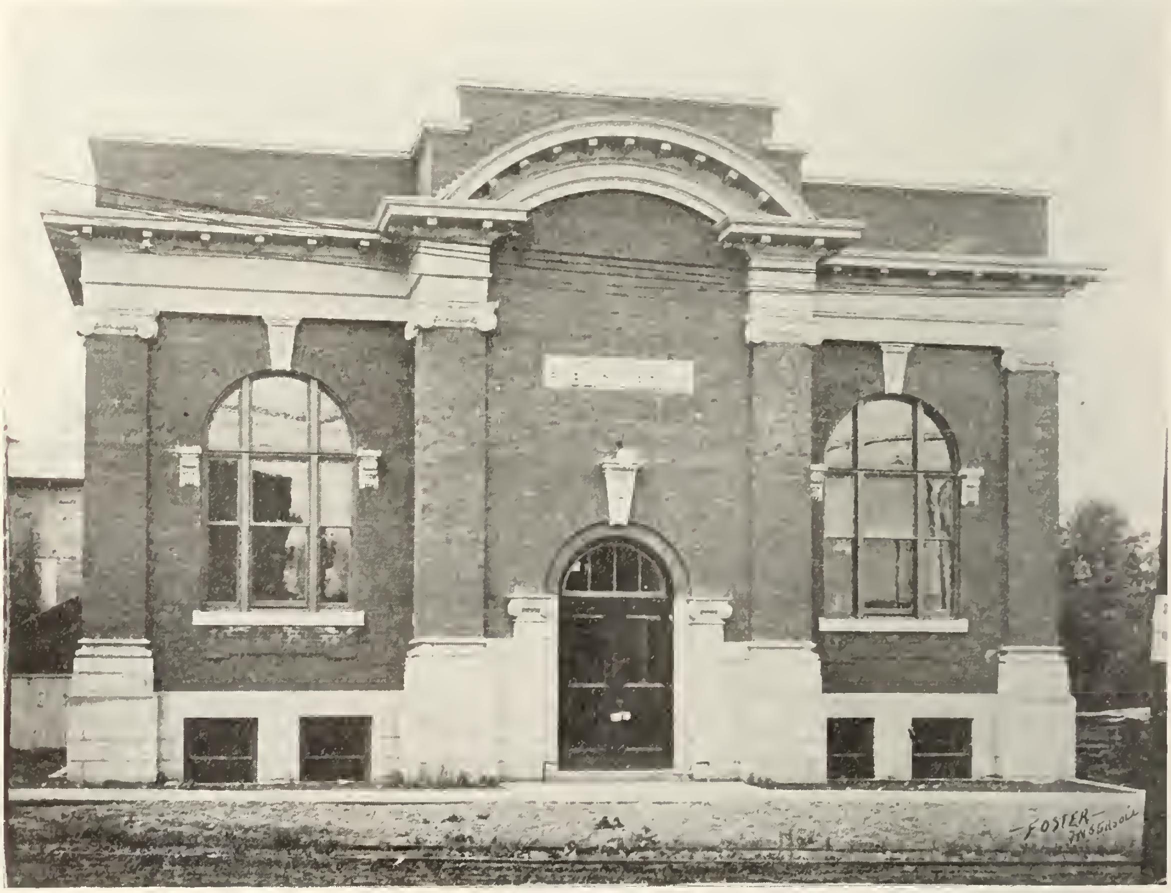

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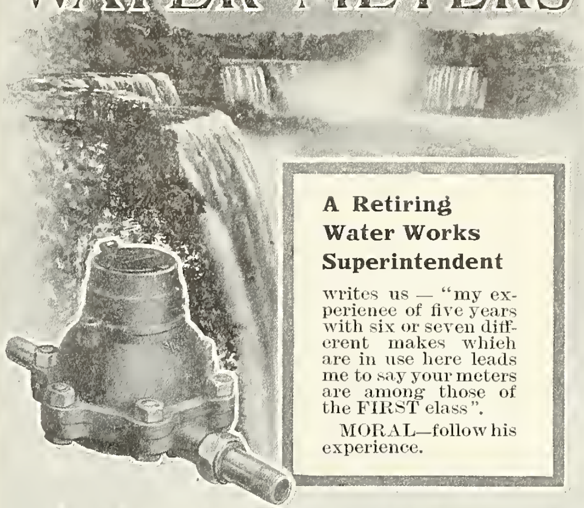

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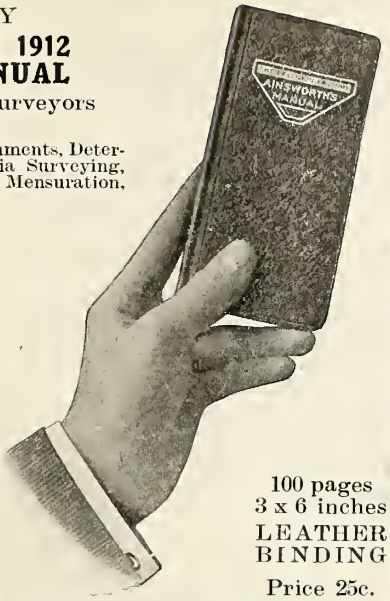

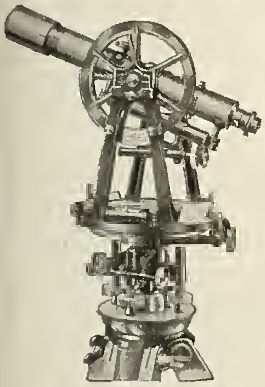

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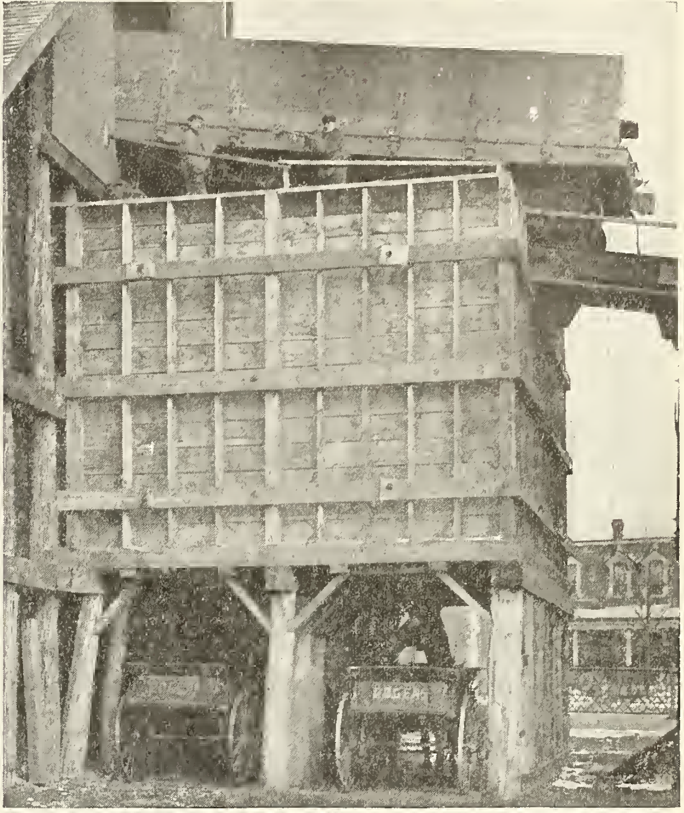

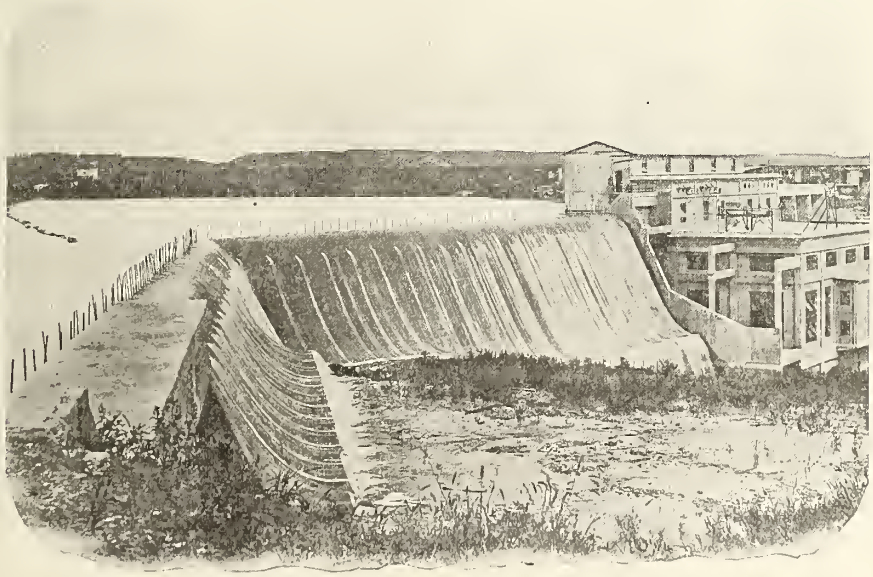

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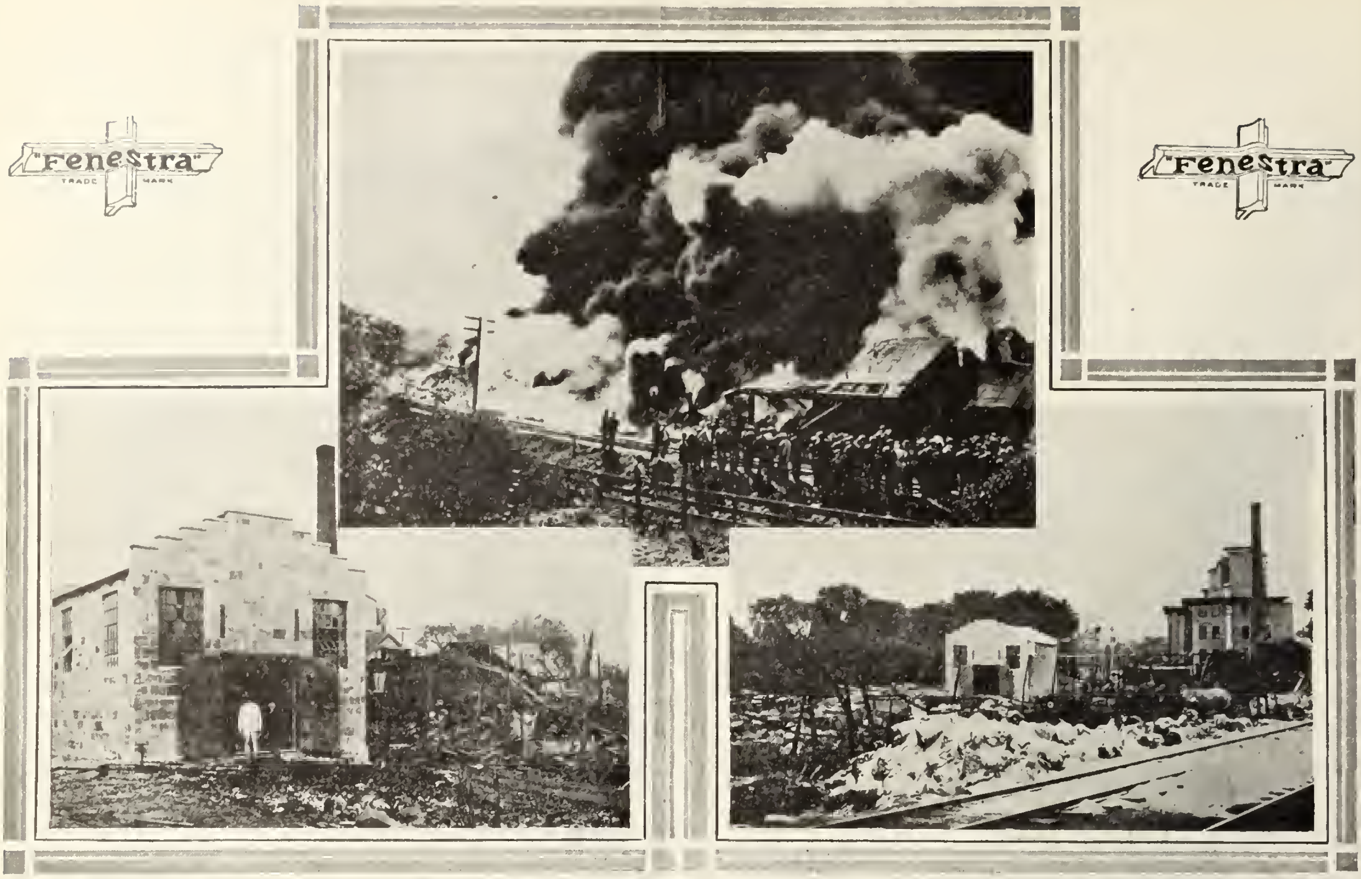

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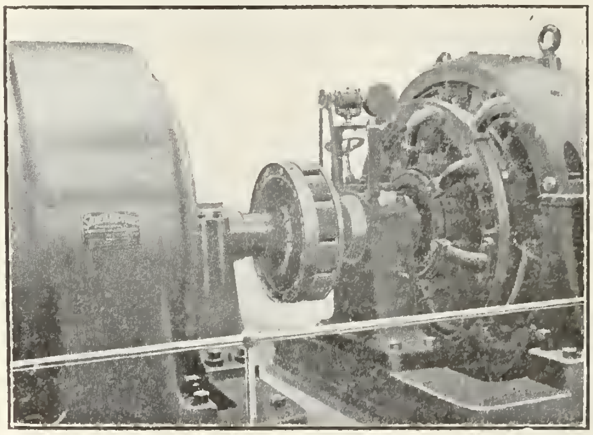

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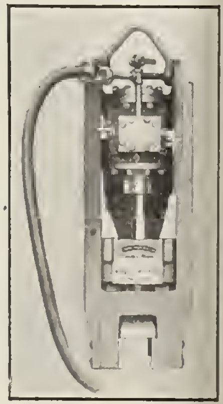

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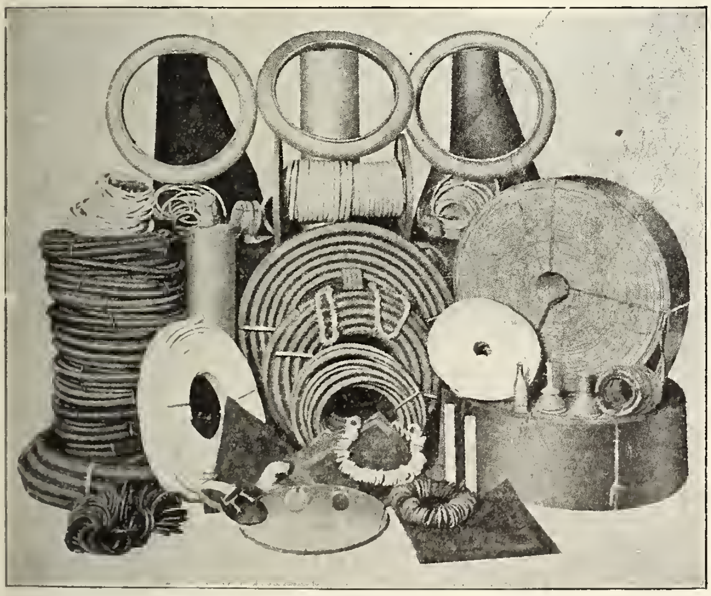

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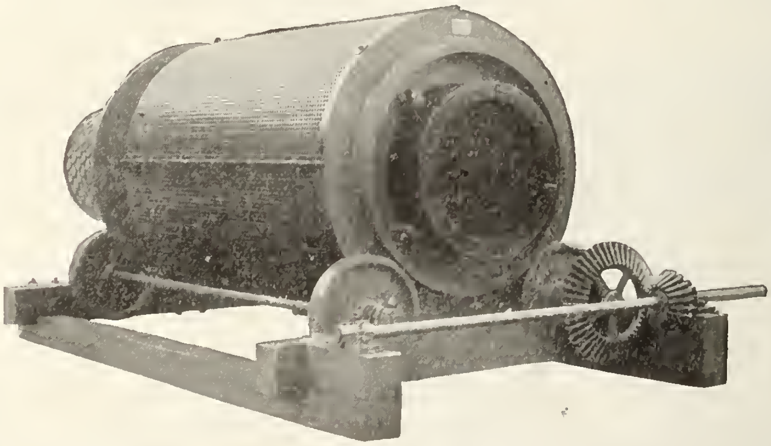

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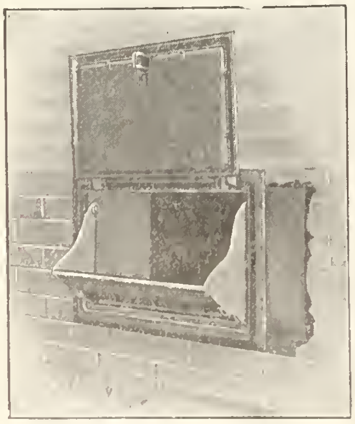

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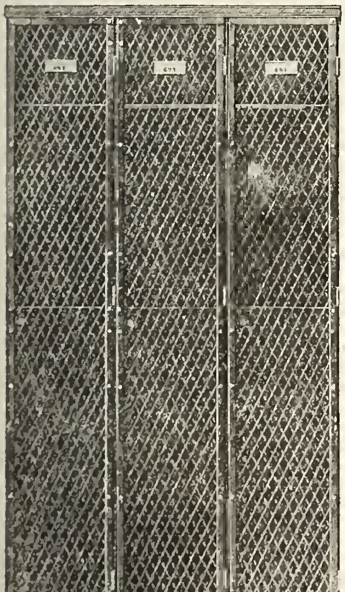

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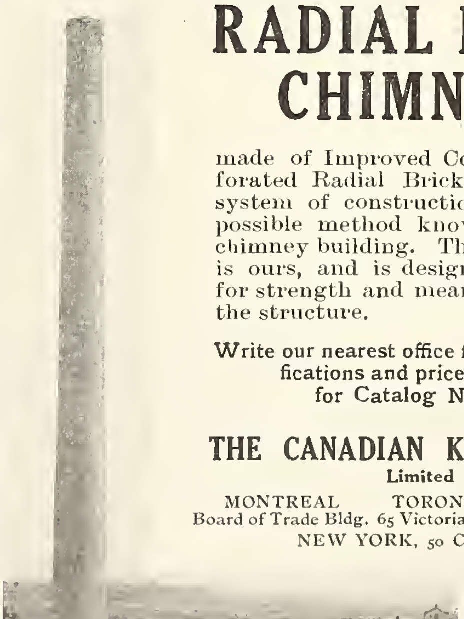

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Vol. 26 January 17, 1912 No. 3

U. S. Engineers for Canadian Cities

THE City Council of Moose Jaw has appointed an "Engineering Commissioner" at a salary of $6,000 a year. This is not all. The commissioner selected is Mr. L. W. Rundlett, of St. Paul, Minn.

In the first place, as a personal matter, Mr. Rundlett is to be congratulated, but one might well wonder what influenced the City Council of Moose Jaw in their decision: whether, under the erroneous impression that wisdom always emanates from the east, they were led astray by the action of Toronto and other cities in flying to the United States for "expert" engineering advice upon the slightest provocation; or whether they had come to the conclusion that the United States was peculiarly the centre for engineering ability.

Surely in such appointments as these our own people should have the first consideration. We venture to say that a salary of $6,000 a year would have attracted a score of Canadian engineers qualified to fill the position. Canada is an engineering country and ample facilities are provided here for acquiring and practising a knowledge of the profession adequate to the requirements of Moose Jaw. The problems incidental to the further growth of cities like Montreal and Toronto are in a class by themselves and arguments may be adduced in favor of getting experts to solve them. These problems have no parallel in the small western city.

Moose Jaw is to be commended in its aim for an improved form of government, but it will inevitably and justly be criticised unfavorably for this appointment.

Inflated land values at Toronto are said to be driving the speculative builders of that city out of business. The prices at which land is selling to-day, according to Assessment Commissioner Forman, are higher than during the disastrous boom of the early nineties. The construction of civic car lines and every other development is anticipated by the real estate men, who offer available land at prices which are absolutely prohibitive to the builder.

Restrictions on Immigration

AMONG the requests made by the delegation of labor men which waited upon the Federal Government at Ottawa last week was that steps be taken to prevent Canada being made the dumping ground for cheap labor from Europe. Just what kind of restrictions this enlightened delegation would like to have made we are not informed, but one may gather that for a time at least they want to secure undisputed possession of the plums in the Canadian field. It is to be hoped that the interests of the country at large and of the millions of British capital involved will not be affected by petitions of this kind, however strong the pressure that may be brought to bear. Canada can find employment for all the labor offering from Great Britain and the continent, whether cheap or expensive. Unskilled labor is needed in the many important municipal undertakings upon which our cities and towns are spending their millions; it is needed in the building construction upon which Toronto and Montreal in one year can spend something like fifty million dollars; it is needed in the reaping of the great western harvests, and it is needed in a hundred ways incidental to each field.

As for skilled labor, everybody knows that the supply in Canada has never met the demand. Every contractor in the Dominion complains of the difficulty of getting good mechanics. The reason for the shortage is due largely to the fact that the country affords no facilities for learning a trade. Nine "skilled" workmen out of ten display the superficial knowledge of their work which denotes their having picked up their trade and improved upon such picking by experience. Apparently, however, skilled labor is not in dispute. It is the "cheap labor from Europe."

We are told by many that Canada is growing up: that it is acquiring a national status. In some ways this is true; in others it is not,—numerically for instance. In any case, if Canada is to attain even a measure of the success which in view of the teeming possibilities of the field should be hers, she must grow bigger and broader. She must realize that competition is to be encouraged, not feared; that "the cheap labor from Europe" brings with it not only its ignorance and its anxiety to secure work even at a low rate of pay, but its brawn and muscle also, its experience, its ideas and — its progeny. Some of Canada's most useful citizens to-day owe their existence to "the cheap labor from Europe."

All these things and many more besides will doubtless have occurred to the reader, but it is as well to place them on record. The engineer, architect, contractor and builder, each has a well-defined interest in the development of the country on the best and broadest lines. Each is concerned with such movements as these. The restrictions which labor men would place upon immigration from Europe are ill considered, narrow and short-sighted. Canada wants all the skilled and unskilled labor she can get and the only qualifications are mental, moral and physical fitness.

From a recent panoramic photo.

Completion of Toronto Filtration Plant

General Summary of Design and Construction with Explanatory Details and Photographic Record of Entire Work

FROM time to time the Contract Record has published progress articles on the slow sand water filtration plant which has just been completed at Toronto under the direction of Mr. C. H. Rust, City Engineer. The first article of the series appeared in our issue of September 29th, 1909, and the fifth and last article in our issue of July 12, 1911. In the following pages we give a summary of the whole work which, with additional data and photographs, will doubtless be of some value to the engineering and contracting interests of Canada inasmuch as this plant is the first of any magnitude built in the country.

It will be within the recollection of most of our readers that Mr. Allen Hazen, of New York, was engaged by the city to prepare plans and specifications for the plant, that tenders for the work were opened in May, 1909, and that the contract was awarded to Messrs. Dill, Russell & Chambers, of Toronto, for $558,000. Operations were commenced in June, 1909, and it was expected to have the work completed by 1910, but the exigencies which arose, particularly the shortage of labor, delayed the completion of the project nearly a twelvemonth. Some criticism was made in regard to this postponement, but investigations showed that the contractors had made every reasonable effort to keep up to the scheduled time.

According to the recent census, the population of Toronto is about 375,000. The total pumpage of water is in the neighborhood of 45,000,000 Imperial gallons, thus giving a per capita rate of nearly 110 Imperial gallons a day. In the design of the plant the rate of filtration assumed was 5,000,000 imperial gallons per acre per day.

It will not be necessary to outline the history of the events which led up to the construction of this plant, but it is of interest to recall the fact that a filtration scheme was suggested some fifteen years ago by Mr. Mansergh, the eminent English engineer. Public interest in the project was stimulated greatly by the recommendations of the Provincial Board of Health and an appropriation for the work was made three years ago.

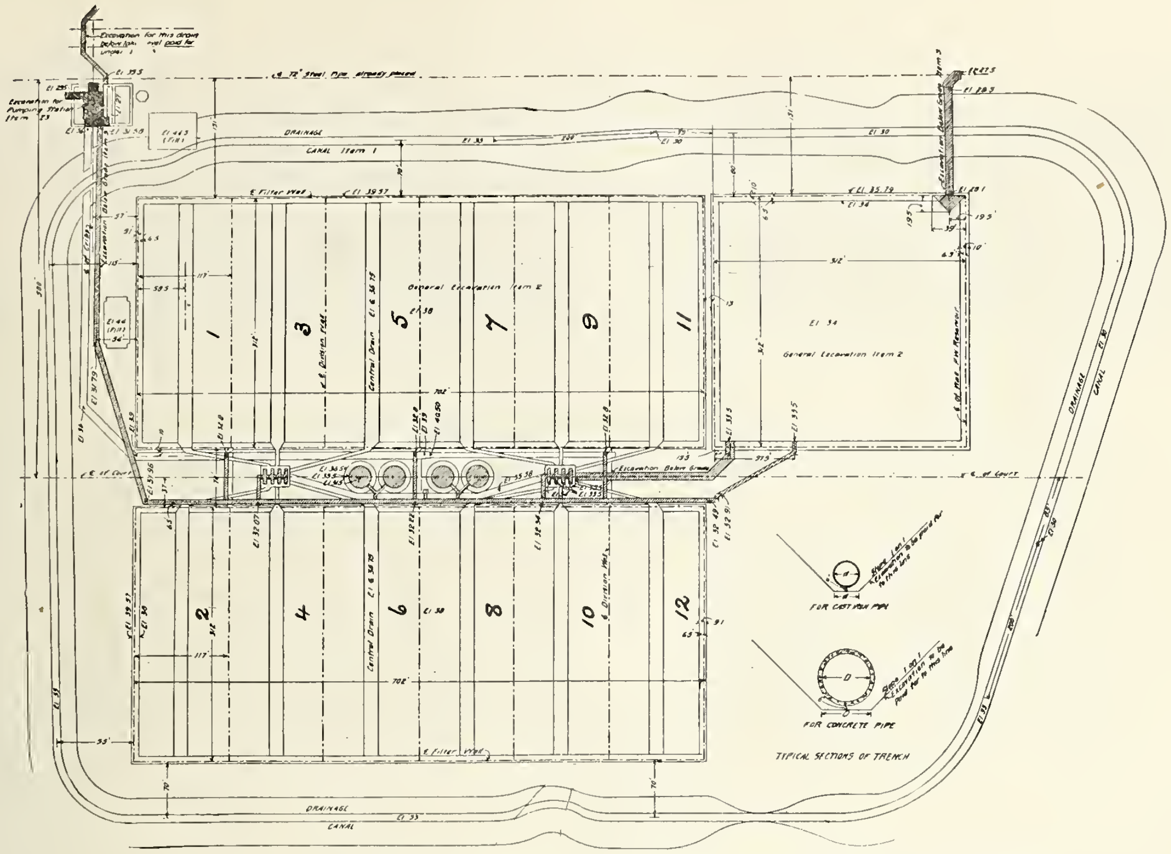
The Toronto filtration plant is located on the Island across the bay, rather more than a mile from the main pumping station, which is connected to the plant by a 6-ft. steel pipe line and a tunnel which passes under the bay directly to the pumping station.

A low-lift pumping station was built at the Island to give the water the necessary lift to enable it to pass to and through the filters and piping by gravity. The pump-well, which forms the sub-structure of this pumping station is built immediately adjoining a steel crib structure on the 6-ft. intake pipe on the Island. From this pumping station a concrete pipe line runs through the central court with branches each way serving as distributors for the unfiltered water to the filters. The general arrangement of the works is shown in one of the accompanying plans. There are twelve filter beds each 117 x 312 ft., grouped equally on either side of a court containing the regulator houses and sand bins. Adjoining these filters is a pure water reservoir 312 ft. square, having a capacity of 7,500,000 Imperial gallons.

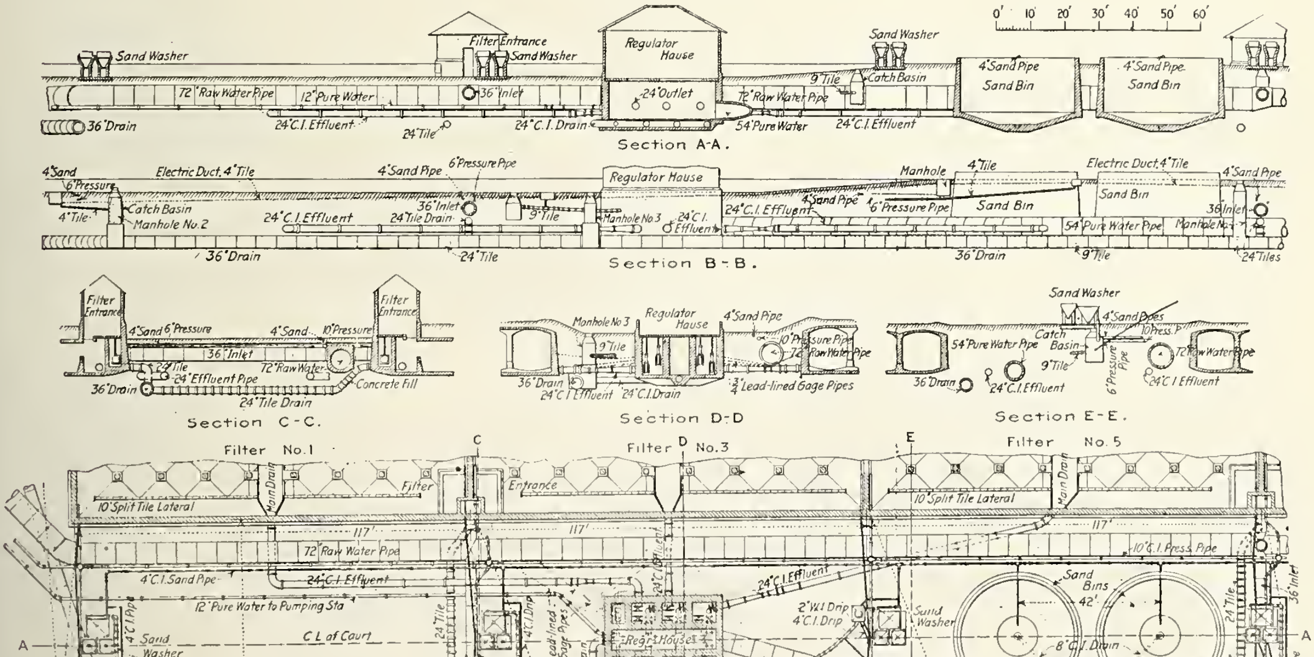
Drainage Canal

As the floors of the filters and the pure water reservoir were a considerable distance below the level

Panoramic view of location of plant at an early stage of the work.



General plan of Toronto Filtration Plant, showing location of drainage canal, the twelve filters and the pure water reservoir.



Plan and details of main pipe system, regulator house and sand bins.

Storage yard for 36-inch, 54-inch and 72-inch reinforced concrete pipe made on the site of the works.

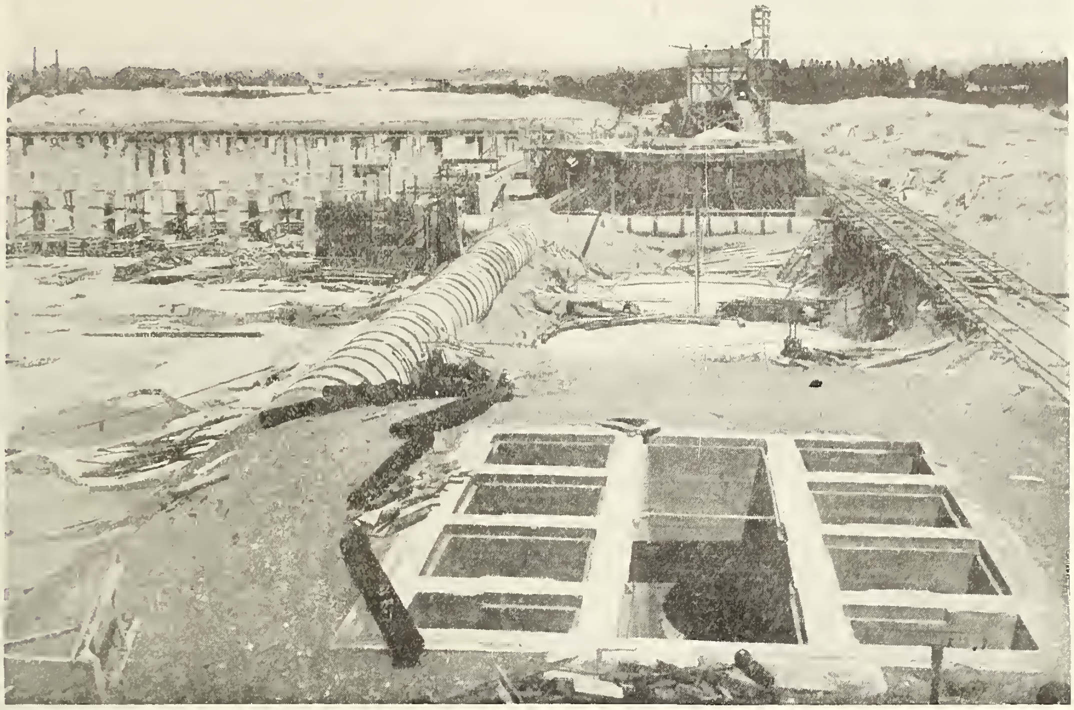
of the lake, the drainage of the work during the construction of the plant was one of the most important considerations in the early stages. The south end of the canal was eight feet below lake level and the north end eleven feet. The scheme devised for keeping the whole site dry was the excavation of a drainage canal. This canal had a total length of some 4,200 ft. and was dredged around the entire work. At three different points the canal crossed the open channel. At these points dykes were built 50 ft. wide at the top and sloped one to five. Thus the drainage canal completely enclosed the site of the whole plant. In the excavation of the canal a bucket dredge was employed and the excavated material was deposited on the banks of the canal so as to facilitate re-filling subsequently. The material excavated on the canal amounted to about 45,000 cubic yards. Dredging operations on the canal are shown in one of the photos reproduced herewith. A central pumping plant was installed, consisting of two 12-inch centrifugal pumps and two 40-h.p. boilers. Pumps were direct-connected to vertical steam engines, each having a capacity of 4,000 Imperial gallons a minute, against a lift of 10 ft. The contractors found that one of these pumps was quite sufficient to handle the entire seepage.

In the construction of the buildings and pipe lines located below the drainage canal, a five-inch centrifugal pump was installed. This was operated during the progress of the foundation work for the regulator houses and sand bins, and during the laying of the 24-inch and 36-inch drains.

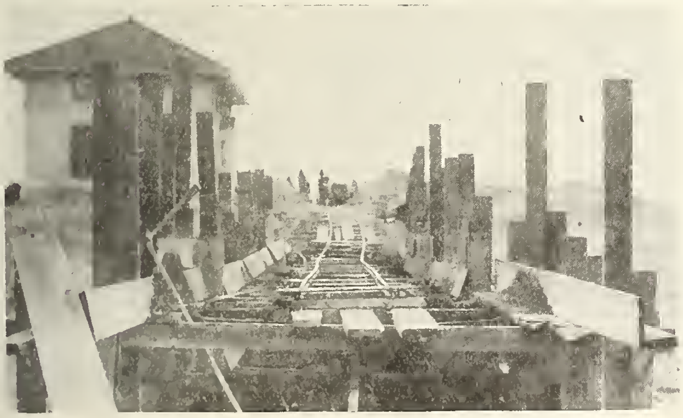
Excavation

The item of excavation included all excavation for the filters, buildings and pipe lines and was divided into two classes, namely, wet and dry. The former class included the foundations for the regulator houses, sand bins, pumping station, and for the 36-in. and 24-in. drains. The latter class comprised the general excavation for the filters and for the remainder of the pipe lines. The general excavation amounted to approximately 113,000 cubic yards and the wet excavation to 3,000 cubic yards, giving a total of 116,000 cubic yards. Teams and scrapers were employed on the excavation. A portion of the excavated material was trapped into cars and hauled by means of

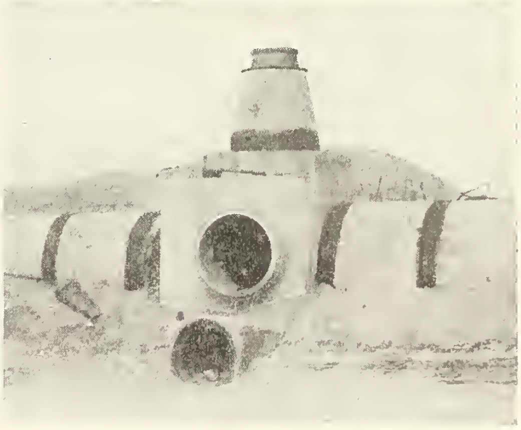
Putting the finishing touches on the drainage canal.—Showing dredge, and concrete office and laboratory building in course of erection.



Completion of regulator house substructure; 72-inch and 36-inch reinforced concrete pipe; foundation for sand bins, completed sand bins and section of filter beds under construction.



Placing concrete at site of Venturi Meter on 72-inch concrete pipe line.



Details of 72-inch, 54-inch and 36-inch reducing branch showing manhole connection and 24-inch drain.

Construction of forms for Venturi Meter.

One of the pumps used in draining the canal. Capacity 4,000 gallons per minute.

The 36-inch main drain in the central court between the rows of filters.

Laying 72-inch pipe connection to city intake.

General view of part of the westerly half of filter beds and central court, showing regulator house foundation in foreground and concrete floor of filter beds in middle distance to right.

a hoisting engine to the tops of the completed filters on the west side where it was used for filling. This material amounted to 83,000 cubic yards. The deepest excavation required was that for the foundation of the pumping house sub-structure, which connects with the 6-foot steel pipe line now supplying the city with water, and from which the water will be taken and raised by pumps to a sufficient elevation to flow over the filter bed. The foundation is about 14 feet below lake level, and owing to the material to be taken out being all sand and gravel, it was found necessary to drive close steel sheet piling to form a coffer dam before starting the excavation. This sheet piling was completed and the necessary excavation carried out hydraulically by using one of the large pumps and washing the sand down to the suction pipe by water jets. The method of using steel sheet piling was entirely successful. The first of the 72-inch and 36-inch reinforced concrete pipe was used in connection with this foundation work, it being built into the walls and carried out beyond the walls of the pumping house station.

Buildings

The walls of the pumping house rest on piles spaced at regular intervals. The station is constructed with a massive reinforced concrete substructure which serves as a pump well. The superstructure is also built of reinforced concrete and the roof is of steel trusses supporting a wooden shell upon which an interlocking tile roof is laid. The station was designed primarily for the use of steam power, but on account of the development of the Toronto Hydro-Electric system a change was made making the electric installation the primary one and on account of the importance of the uninterrupted service at the station, the steam pumping plant is retained as a complete duplicate installation for handling the raw water to the filters. The principal electric units for the supply of water to the filters are three screw pumps, each consisting of a vertical draft tube which dips down into the pump well and in which is mounted a propeller operated by a vertical shaft direct-connected to a vertical motor above. The lift for these pumps will average in the neighborhood of 8 ft. The discharge from each of these screw pumps will be controlled through a 48 x 36-in. sluice gate, electrically operated. Provision is made also for three additional screw pumps, similar to those just described, when the necessity arises for increasing the supply of water. The steam auxiliary for this equipment consists of a 48-in. centrifugal pump, direct-connected to a tandem compound Corliss engine. The water lifted by either of these pumping equipments is discharged into a suspended well of reinforced concrete at the proper elevation, from which it flows through the 6-ft. concrete pipe main to the filters.

The 72-inch pure water pipe line showing method of lowering and placing these pipes, each of which weighs about 5 tons.

36-inch main drain and 72-inch raw water pipe at site of Venturi meter.

The equipment for supplying water under pressure for the sand-washing operations consists of two 8-in. centrifugal pumps, direct-connected to electric motors. These pumps take their suction from the main pump well and discharge the supply of unfiltered water into a 10-in. cast-iron pressure line which runs from the pumping station down the length of the central court with 6-in. branch pipes to the various filters supported on brackets along the division walls between the filters.

A drainage pump is provided, consisting of a 12-in. centrifugal pump, direct-connected to a 25-h.p. variable-speed electric motor, which pump drains the 36-

36-inch main drain connecting with pumping station.

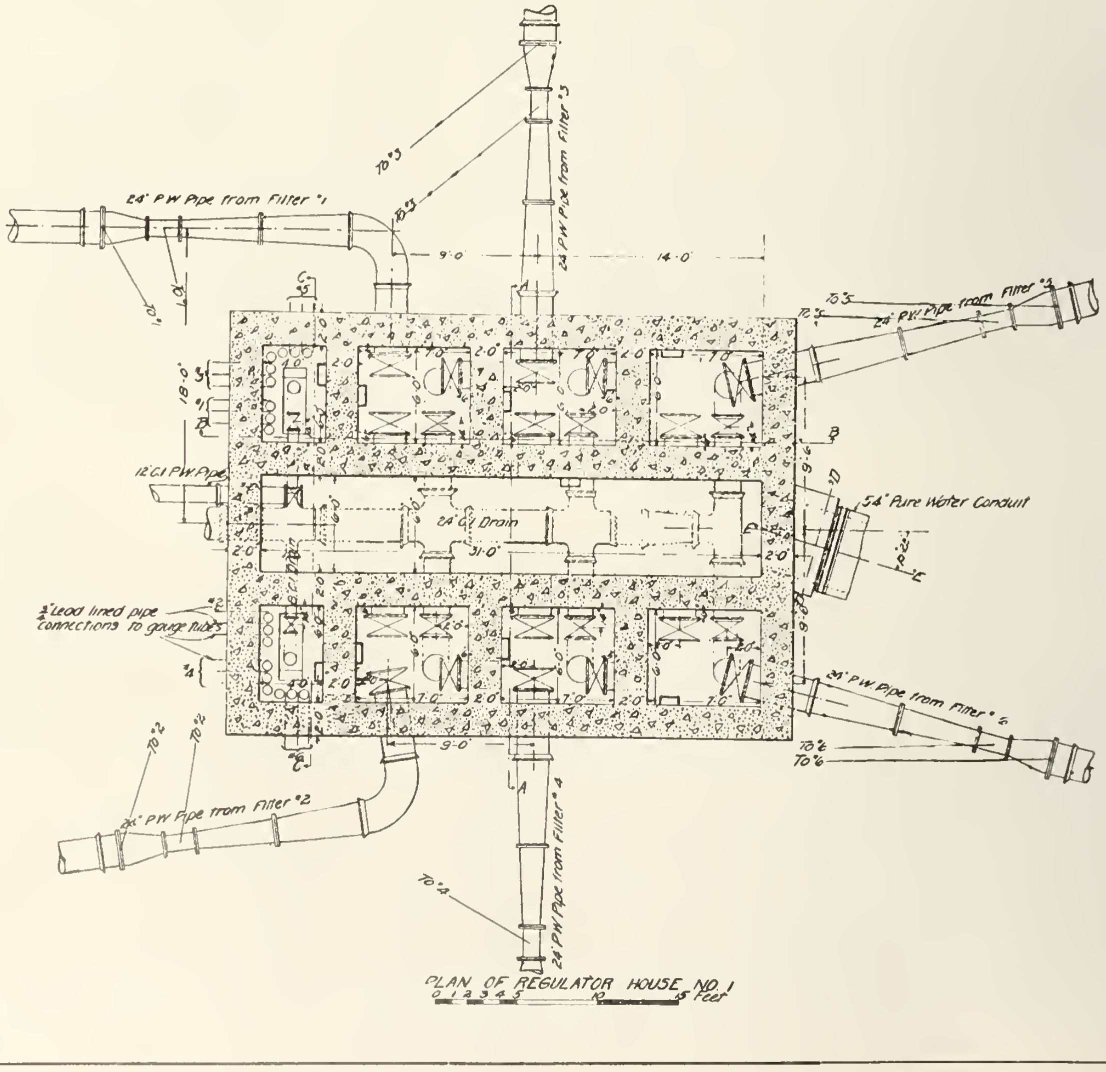
in. concrete pipe drain into which every portion of the plant is connected. This pipe is laid at a depth of nine feet below lake level.

72-inch concrete pipe line, the main from regulator house to pure water reservoir—showing method of outside jointing and bends.

72-inch concrete pipe.—Completed bend.

A boiler plant consisting of two 100-h.p. fire-tube boilers is provided for the emergency steam-pumping equipment and also for steam heating for the pumping station and for the office and laboratory building. A coal pocket 52 x 39 ft. in plan, with an available storage depth of about 10 ft., is built adjoining the pumping station and connected to it by a tunnel. This coal pocket is similar in construction to the filter masonry, with inverted arch floor and piers and walls supporting a groined-arch roof. The section of this roof is heavier than the filter roof, however, and is heavily reinforced to withstand the weight and vibration of loaded coal wagons.

A gallery is built along the entire end of the main engine-room in the pumping station, upon which are mounted the switchboards. On these switchboards are located the controllers for all the motors in the


24" P.W. Pipe from Filter #1
To #3
To #3
24" P.W. Pipe from Filter #3
9·0"
14·0"
C
A
18·0"
#3
#1
B
12" C.I. P.W. Pipe
24" C.I. Drain
31·0"
2·0"
7·0"
6·0"
9·6"
D
54" Pure Water Conduit
22·6"
E
To #5
To #5
24" P.W. Pipe from Filter #5
B
½" Lead lined pipe connections to gauge tubes
#2
#4
9·0"
To #2
To #2
24" P.W. Pipe from Filter #2
A
24" P.W. Pipe from Filter #4
To #4
24" P.W. Pipe from Filter #6
To #6
To #6

PLAN OF REGULATOR HOUSE NO. 1

0 1 2 3 4 5 10 15 Feet

pumping station, for the electric lighting in the various buildings and the court and also for certain of the apparatus connected with the local transformer station and for the lighting arrangements for the entire island.

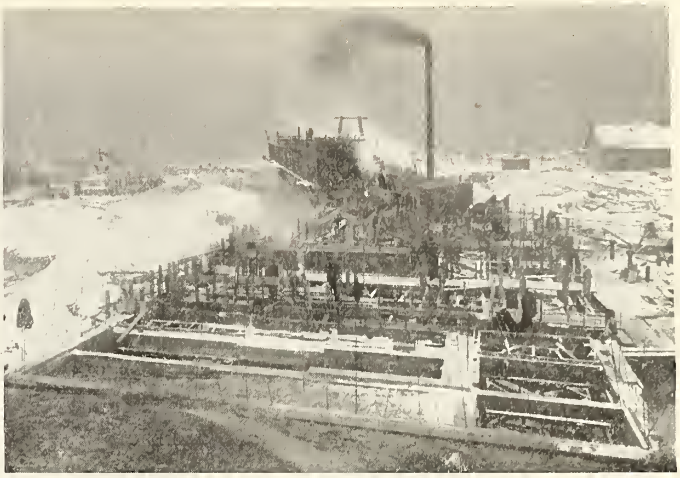
The office and laboratory building is very similar in its type to the pumping house. The structure is built entirely of concrete, the walls, floorings, stairways and chimneys being constructed of concrete reinforced with twisted steel bars. The roof is covered with French A roofing tile, a material which has a pleasing effect upon the finished structure. The building is of two storeys and full basement. It is designed to accommodate the officials engaged to look after the technical features of the operation of the plant. Adequate provision has been made for rendering this building up-to-date. Modern offices and testing laboratories are provided, as well as living apartments for the officials. The building is equipped with bathrooms and steam heating plant.

In finishing the outside walls of the administration or office building an excellent effect was produced by rubbing the surface with carborundum bricks.

There are two regulator houses of reinforced concrete construction. Each of these structures contains the effluent gates of six of the filters, the means for controlling the refilling of the filters after cleaning, the devices for obtaining an accurate measure of the velocity of the water through the filters, and also the devices by means of which the condition of the filters as regards cleanliness may be observed at any time. Each of the two regulator houses consists of a concrete floor in which is laid a system of cast iron pipes and proper controlling valves, which form the waste drainage system of the filters. Above this floor the sub-structure is built up of a massive and monolithic concrete construction, the building having a cellular structure, being divided longitudinally by two walls, and each of the outer compartments so formed being sub-divided into four smaller cells. Six of these small cells serve as outlet chambers for the water flowing from six individual filters.

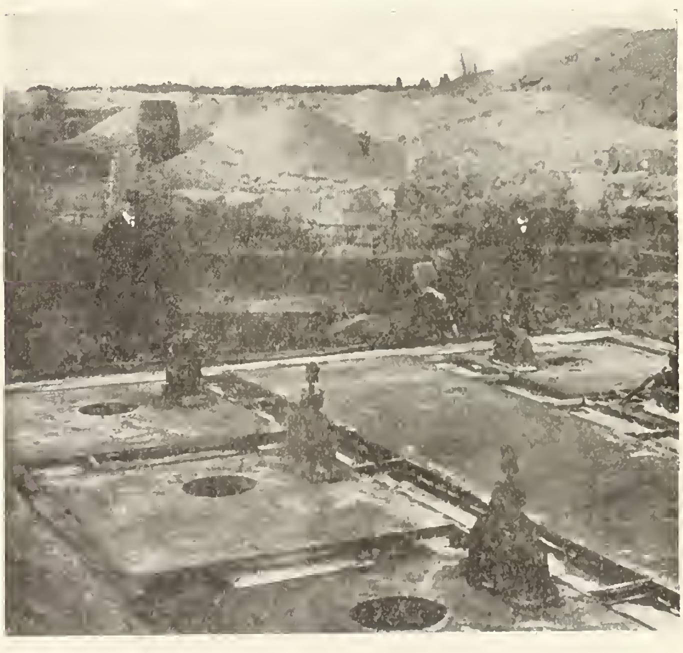
. Cast iron drain piping in regulator house substructure.

In each of these outlet chambers there is located a 24-inch gate valve upon the end of the cast iron effluent pipe from the filter. There is also an opening controlled by a 24-inch gate valve between this outlet chamber and the larger central chamber. The flow in normal operation is from the filter through the effluent pipe into this outlet chamber and thence through the second gate into the central chamber, from which the water flows through the large concrete pipe to the filtered water reservoir. Between each two adjoining outlet chambers there is an opening in the wall controlled by a 20-inch gate valve. This valve is used in refilling a filter after it has been cleaned. It is essential in refilling a filter with water to fill it from below instead of from above. This is very easily accomplished in the case of any filter by opening the 20-inch valve connecting its outlet chamber with that of the adjoining filter, closing the 24-inch outlet gates between the outlet chambers and the central chamber, when the flow will take place from the filter in operation through the 20-inch valve and into the under drainage system of the filter to be filled.



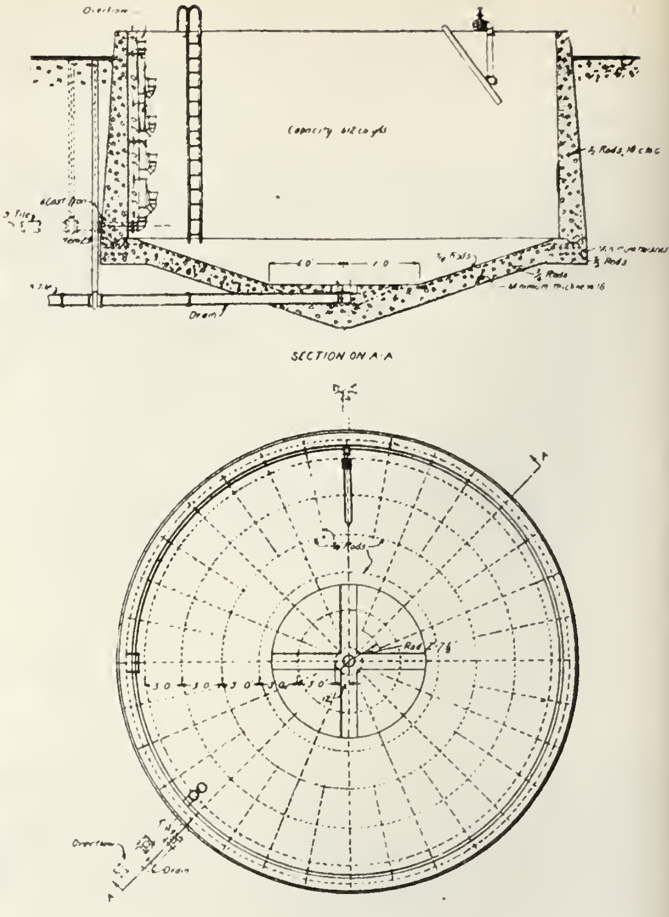
Foundation of main pumping station.

On the 24-inch effluent pipe from each filter there is located a Venturi meter. Pressure pipes from the throat and inlet of each of these meters are carried into one of the two unoccupied cells of the regulator houses. There they are attached to vertical tubes in which the water will normally stand at elevations determined by the conditions of pressure at the mouth and throat of the meters. In each vertical tube there is to be a float which will be connected by means of a wire passing over pulleys to an indicating device located on the wall close to the outlet valve above the floor. This device will indicate the quantity of water flowing at any moment in millions of gallons per acre



Concrete floor of regulator house substructure, showing arrangement of pipes and controlling valves.

Bins for storing washed sand for filters.



Constructional details of storage bins

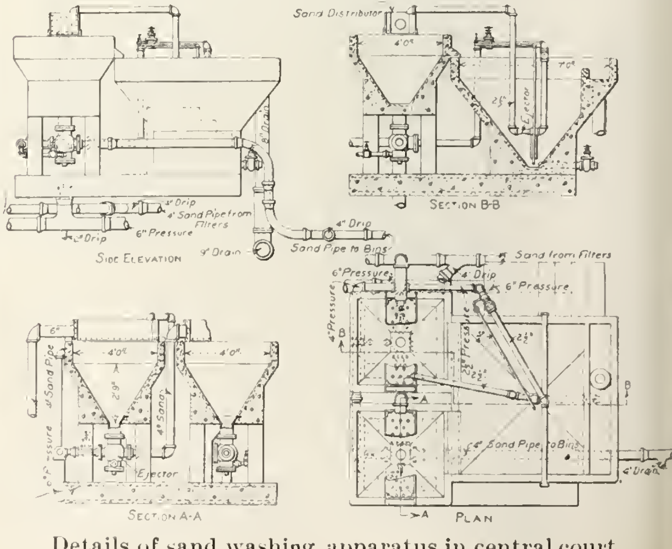
per day. Another small pipe is carried from the free water surface of each filter into the chamber containing the vertical tubes, and is there attached to another vertical tube which contains a float wired up in a similar manner and connected to the indicating device belonging to that particular filter. This float, together with the float belonging to the mouth of the Venturi meter, actuates a device which indicates the loss of head through the filtering material, or in other words the friction through the filter. In this one indicating device we therefore have an indication of the rate of filtration and of the frictional resistance in the filter, both of which form a very important part in the practical operation of the filters.

Detail of main drain outlet to regulator house.

Showing method of reinforcement and building forms for sand washers.

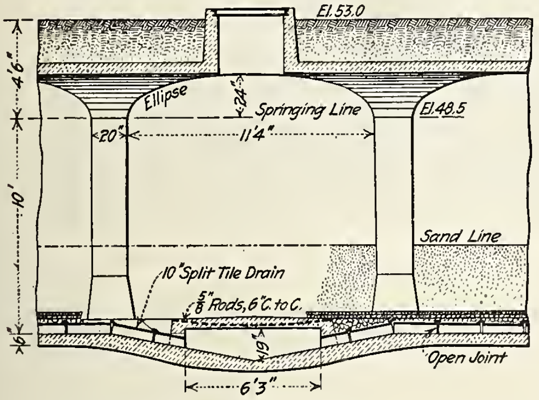
Concrete Pipe

In the construction of this plant approximately 3,300 feet of reinforced concrete pipe was used. The three sizes of pipe were 72-inch 54-inch and 36-inch. The sub-contractors for the pipe were the Lock Joint Pipe Company, of New York City, who shipped forms to the plant and manufactured the pipe at the site of operations. The 72-inch and 54-inch pipe were used for the main raw-water distributor between the pump-

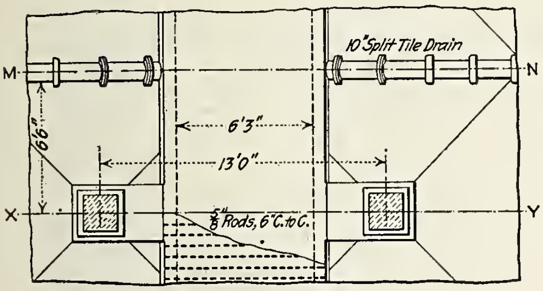


Details of sand washing apparatus in central court.

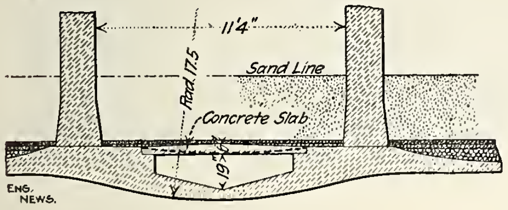
ing station and the filters and also for part of the filtered-water carrier. The 36-inch pipe was used for the main waste drain and for branches to the filters from the main raw-water distributor. Unusual precautions were taken in the design of these pipe and in the specifications for their construction to obtain water-tightness. Each length of pipe was laid in the trench, fitted to the lengths already laid and brought to line and grade supported on wooden blocking. The bell and spigot ends of the pipe were designed so that the inside joint had a dovetailed shape, and this dovetail was finally filled with cement mortar.



Section M–N.



Part Plan.



Section X Y.

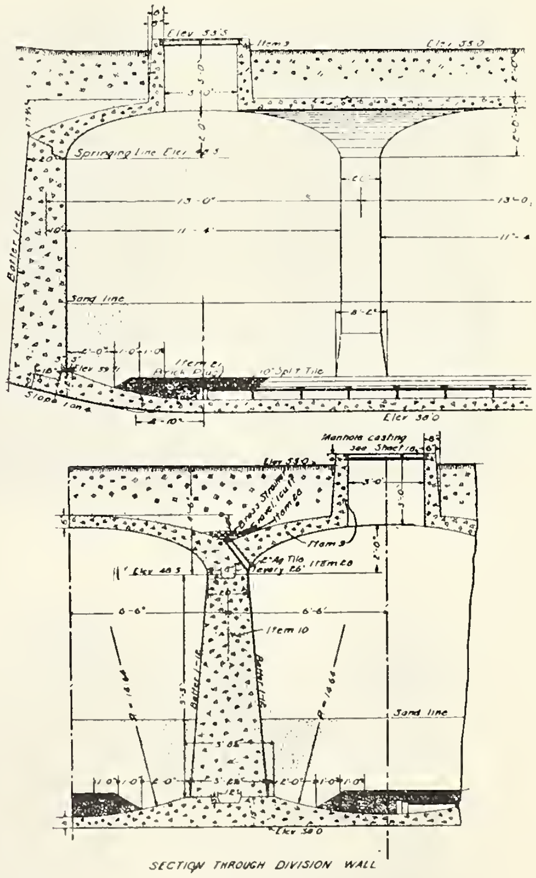
Details of main drain

In order to avoid a settlement of the pipe lines the inside joints were left open until the pipe had settled as nearly as possible to its final position. With this end in view a temporary joint was made on the outside of the joint as follows: The joint was first caulked from the outside with oakum. The outside surface of the pipe for several inches each side of the joint was then coated with hot tar and covered with alternate layers of building paper and hot tar and finally with a strip of burlap bound with iron wire twisted tightly into position, one each side of the joint. After some little experience with this joint it was found advantageous to soak the oakum used in calking the joints in melted tallow. After these outside joints had been completed the trenches were backfilled.

In order to avoid breakage due to the unequal settlement that so often occurs where a pipe-line enters a massive structure much less liable to movement, a vertical joint was provided in the concrete pipe immediately outside of every masonry structure that the pipe enters. Short sections of concrete pipe, designated as stubs, were cast, having a laying length of 13 ins. Where the concrete pipe-line is to enter a masonry structure one of these stubs is built solidly into the masonry with the bell or spigot projecting and the pipe-line is laid from this stub, thus providing a plane of cleavage within a few inches of the larger structure.

The larger-sized pipe was handled by means of a derrick running on tracks alongside the trench. Each section of the 72-inch pipe weighed about 4½ tons. For the 36-inch pipe a small steel framework running on wheels and supporting a beam with a differential block and tackle rolling upon it was used. The pipe was rolled out onto planking over the trench and then lifted by the tackle, the planking removed and the pipe lowered to its place.

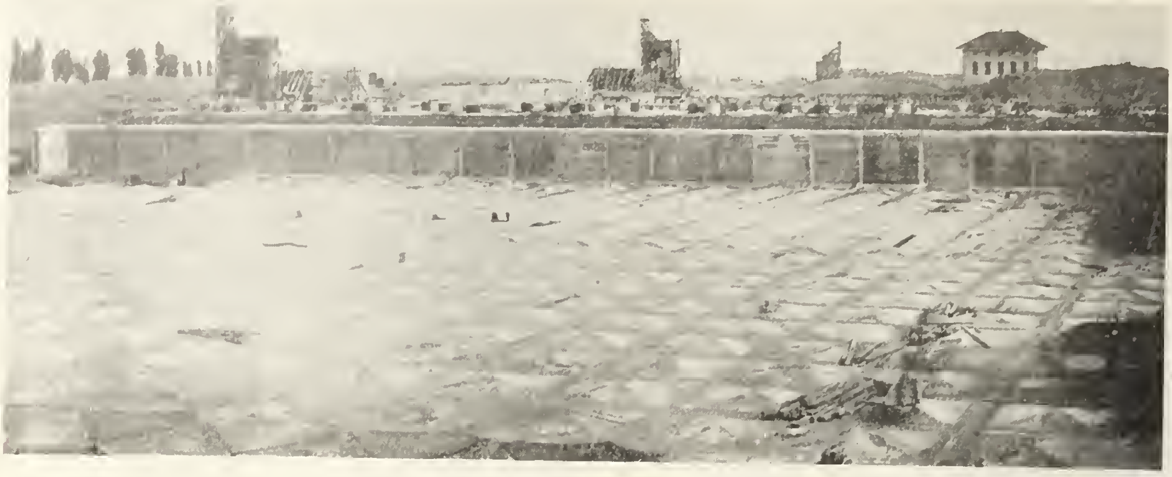
The manholes on the various pipe-lines are built up of lengths of 36-inch pipe set vertically upon the top of the monolithic structure on the pipe-line itself. These vertical sections are surmounted at the right height by reinforced-concrete reducers which were cast in the same manner as the pipe and upon the top of these are placed the cast-iron manhole frames. The masonry structures forming the bottom of the manholes and the bends and connections between two or more pipe-lines have been built as monolithic concrete structures.



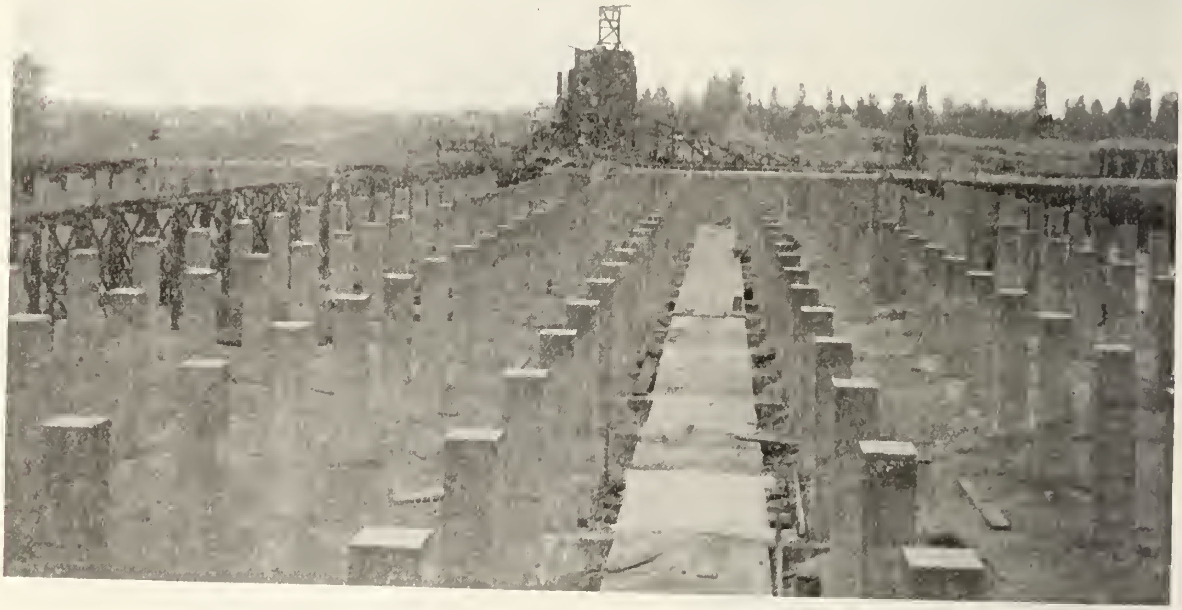
Filter Details

Piping and General Arrangements

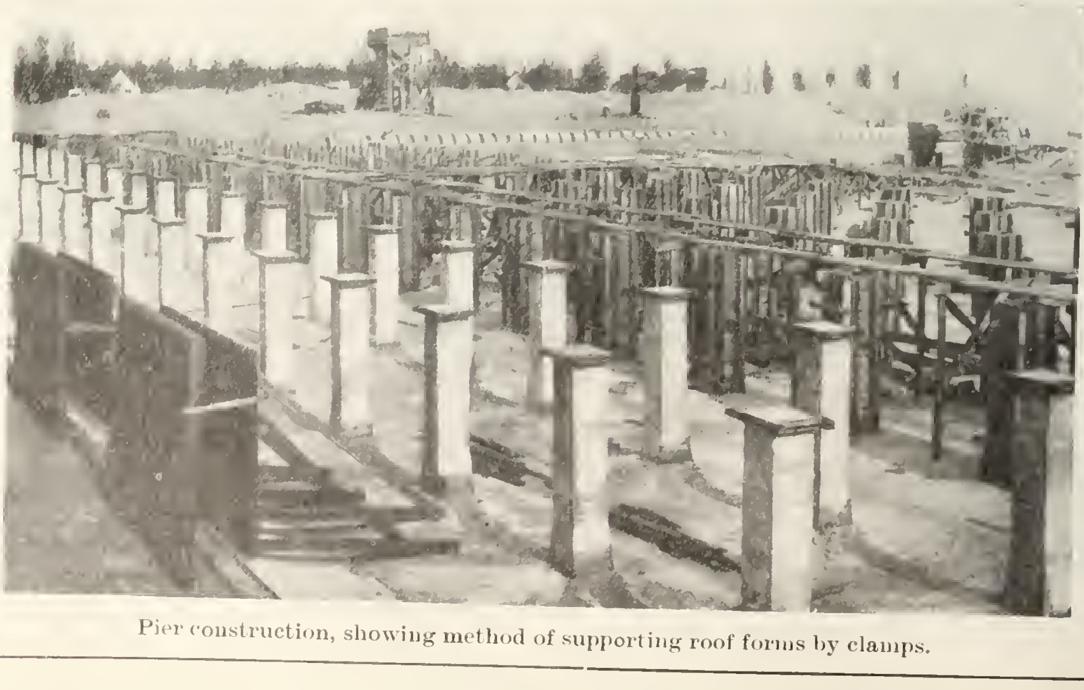
From the front walls of the filters the filtered water will flow through 24-inch cast-iron effluent pipes with a Venturi meter upon each line discharging



Concrete floor of pure water reservoir, area 2¼ acres.



General view of filters showing covered main drain and concrete piers.



Pier construction, showing method of supporting roof forms by clamps.

into the substructure of the two regulator houses. Each regulator house serves six filters. In the regulator house there is a separate compartment for each filter effluent with the necessary gates for controlling the rate of filtration, the backfilling of the filter and the flow into the central compartment from which a concrete pipe-line runs out to the pure-water reservoir. In each regulator house there are two small compartments for dry wells in which are located the float pipes connected with the Venturi meters. A complete drainage system is provided in the massive concrete floor of each regulator house. A line of 54-inch concrete pipe serves as carrier for filtered water from the first to the second regulator house and a 72-inch concrete pipe-line from the second regulator house to the pure-water reservoir. This reservoir is similar in construction to the filters except that it has a greater depth. There is no controlling device of any kind upon the flow of water through the reservoir. The water will flow to it freely from the filters and the flow from it will depend upon the rate of pumping at the main pumping station in the city.

A complete system of drainage is provided for the plant. This consists of a main drain of 36-inch concrete pipe, already referred to, with 24-inch branches of vitrified tile entirely surrounded with concrete from the several filter entrances, and numerous smaller connections with catch basins, sand bins, sand washers, electric-duct manholes, etc. The 36-inch main drain is laid through the central court and into a drainage well in the pumping station, and thence to a lagoon.

The relative levels of the filters and of the lake are such that the drainage can be effected only part of the time by gravity. At other times the flow in this drain must be lifted a few feet to discharge above lake level. Two gate arrangements are therefore provided in this drainage well: one, a 36-in. circular sluice gate, which is open when conditions permit a gravity discharge, and the other a 16-in. by-pass discharging into the outflow portion of this drain beyond the 36-in. sluice gate through which the drainage flow is discharged when necessary by means of a low-lift centrifugal pump.

The construction of the filters has been described in detail in previous numbers and extended reference will be unnecessary in this article. A careful examination of the photographs reproduced herewith will be especially informative. In one of the pictures we give a view of the filters showing the covered main drain and concrete piers. This main drain is about 6 ft. in width. Ten-inch split tile are built into the sides of the drain at intervals of 13 feet. This tile extends in parallel rows from the main drain to the division walls and collects the filtered water which is gathered into the main drain and carried through a 24-inch cast iron pipe to one of the regulator houses. From there it passes into the pure-water reservoir, and thence to the city pumping station. The main drain extends the whole length of each filter and is 312 feet long, the size of each filter being 312 by 117 feet. From the filters the water passes to a pure-water reservoir which is 312 feet square and covers an area of 2¼ acres. The floor contains over 2,500 cubic yards of concrete. There are 529 piers, each 12 ft. 3 in. high and placed 13 feet centre to centre each way. The walls are 12 feet high and average nearly 3 feet in thickness.

The cement used throughout the entire work was Canadian Lehigh Portland Cement furnished by the Canada Cement Company. Although the specifications for the cement were rigid and notwithstanding the fact that upon the delivery of the material samples were carefully tested at the city laboratory, none of the cement was rejected out of approximately 56,000 barrels delivered on the work. The specifications for the cement were based upon those adopted for the American Society for Testing Materials.

View of construction showing various portions of the work.

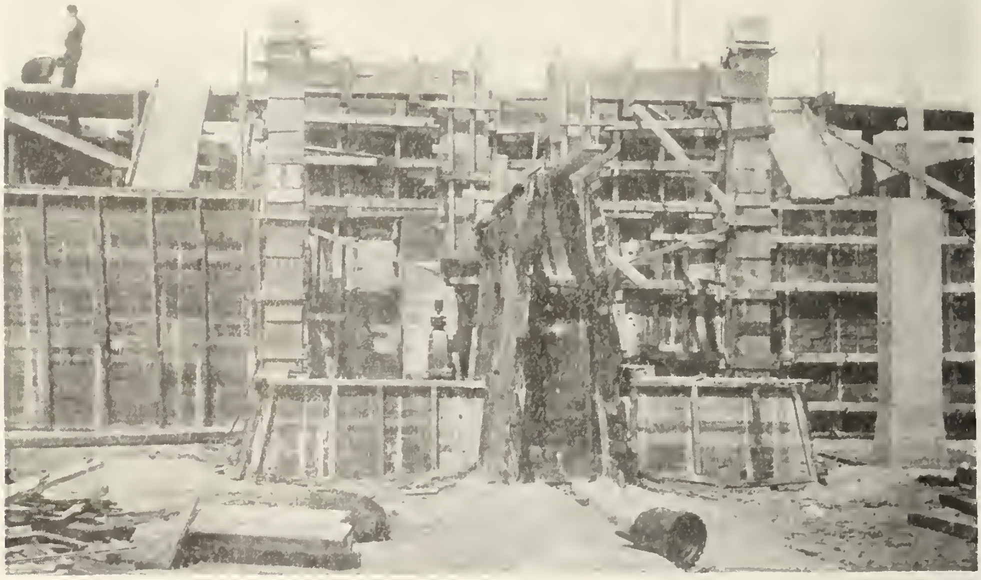
Sand Storage Bins and Sand Washers

For the storage of the sand which it is necessary to have in stock for the renewal of the surface material for the filters, four circular bins have been constructed. Each of these bins has a capacity of 612 cubic yards, the inside diameter of each being 34 feet and the depth about 21 feet. The conical bottoms of the bins were placed first and included complete arrangements of piping and perforated brass plates and screens for the prompt draining of the water from the sand. The bottoms are heavily reinforced, especially at the outer edge, around which were carried eight ¾-inch rods which form a very strong ring or collar of reinforced concrete to resist the unusual stresses upon the structure under the various condi-

Outside walls of pure water reservoir and filters, and starting of concrete roof.

End and division walls of filters, the foundation for entrance building and raw water inlet to filters.

tions of loading. Upon this base a circular barrel forming the side walls of the bin was built. The entire bin is depressed so that only 2 ft. of the top of the bin appears above the level of the surrounding ground. Suitable overflows at various heights are provided to carry away excess of water from the bin.

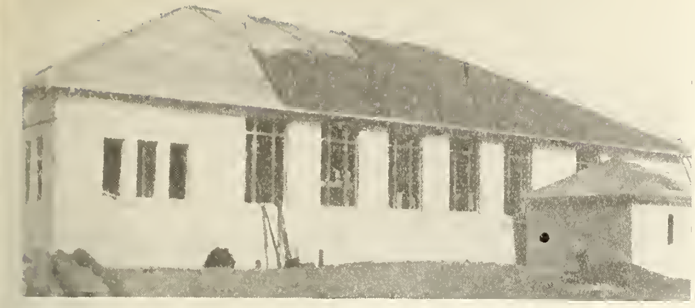


Form work for foundation of entrance building.—These buildings are placed over the division wall and each serves two filters.

The equipment for cleaning the filters and recovering and restoring the sand to the filters consists in general of the following parts: a piping system to carry water under pressure into the filters and to the sand washers and to carry the slush of sand and water in the ejecting and washing processes from the filters to the washers and from the washers to the sand bins; centrifugal pumps in duplicate in the pumping station for supplying water for this purpose; movable ejectors of suitable design for ejecting the dirty sand

Forms for groined arch concrete roof.

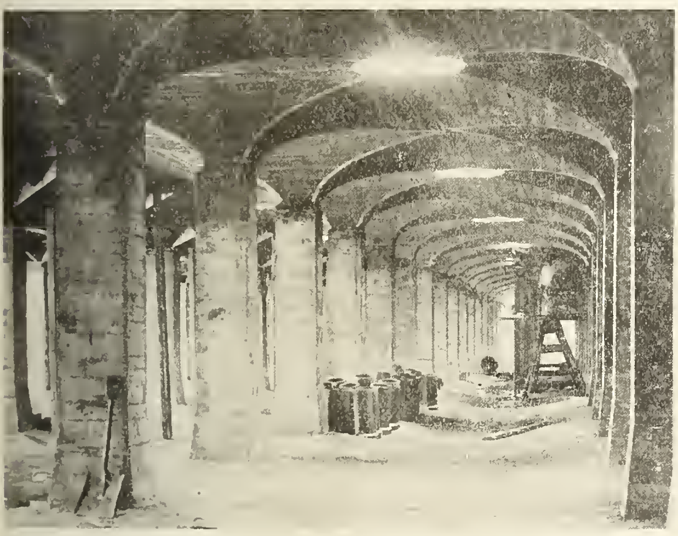
Washers for filtered sand.



Pumping house nearing completion.

from the filters; the sand washers in the court; the sand bins for the storage of clean sand, and the appliances for replacing sand in the filters.

The piping system consists of a 10-in. main leading from the pumping station throughout the length of the court with 6-in. branches opposite each filter wall, passing through the front wall and continuing as a 5-in. wrought-iron pressure line along the side walls of the filters, and with other branches leading to the sand washers; also a 4-in. wrought-iron pipeline along the side walls of each filter, passing through the front wall as a 4-in. cast-iron line which leads directly to the washers and from the washer leads to the discharge into the sand bins.

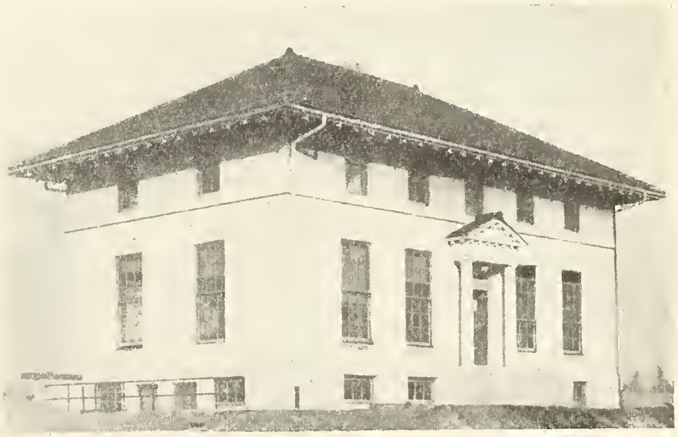


An interior view of the filters showing piers and groined arch roof.

The movable ejectors are of the type which has been used successfully at a number of other plants; consisting of a rectangular box of steel with the ejector and irrigating pipes in the bottom of the box and the box provided with two hose connections, one for the supply of water under pressure to the nozzle, the other for the discharge to the sand pipes along the filter wall.

Completed regulator house and sand washer.

The sand washers consist briefly of reinforced-concrete hoppers into which the slush of dirty sand and water from the filters is discharged. A jet of water subject to adjustment is admitted into each of these hoppers at the bottom, causing a vertical velocity of water in the hopper which is designed to carry the dirty water away at the overflow while still permitting the scrubbed sand to fall freely into the bottom of the hopper where it is picked up by an ejector and carried forward to the sand storage bins. There are two of these hoppers in each sand washer and the sand goes through them successfully for the sake of thoroughness in cleaning. The overflow from these two hoppers goes into another large hopper, also of reinforced concrete, which serves as a catch basin to recover the fine sand which always goes over in considerable quantities from the washer hoppers and further prevents this from going into and clogging up the drainage system. An overflow the full length of this hopper carries the dirty water, now entirely free of sand, away to the sewers. A small ejector is provided in the bottom of this hopper by means of which the sand that accumulates therein may be discharged from time to time back into the washer.



Completed office building.

Filtering Materials

The filtering material consists of two layers. The top layer consists of 3 ft. 6 in. of sand, the other of 12 in. of broken stone or gravel in graded sizes, coarse at the bottom and fine at the top where it supports the sand. Approximately 13,000 cubic yards of washed stone and gravel were used in the filters and about 56,000 cubic yards of sand.

The firms that supplied machinery and materials for the work were as follows:

H. S. Howland Sons & Co., Toronto, hardware and wrought iron pipes; Ludowici Celadon Co., Chicago, Ill., tiles for roofs; Point Anne Quarries, Ltd., McKinnon Building, Toronto, crushed stone; Canada Foundry Co., Toronto, cast iron pipe, boilers and roof truss for pumping station; F. H. Hopkins & Co., Montreal, two concrete mixers; W. & J. G. Greey, Toronto, screening plant; E. Leonard & Sons, London, Ont., engines; Doty Engine Works, Goderich, Ont., hoisting engines; Morris Pump Works, Baldwinville, N. Y., two 12-in. centrifugal pumps; T. H. Wach, Chicago, Ill., two 8-in. centrifugal pumps; Dominion Sewer Pipe Co., Toronto, vitrified pipes and split tile; Canada Cement Company, Montreal, Lehigh Portland cement; Lock Joint Pipe Company, New York, 72, 54 and 36-in. concrete pipes; John Inglis & Co., Toronto, one Corliss engine, two 150-h.p. boilers and 48-in. centrifugal pump; Canadian Westinghouse Company, Hamilton, electric motors and switchboard appliances; Allis-Chalmers Co., Milwaukee, Wis., electric pumps; Martin Pump & Machine Co., Toronto, duplex pumps; Marsh & Henthorn, Belleville, concrete mixer; Jenckes Machine Company, St. Catharines, locomotive boiler; Jeffrey Manufacturing Company, Montreal, drag scrapers and materials for sand washers; A. R. Williams Machinery Company, Toronto, hoisting engine, etc.; Berg Machinery Company, Toronto, marine boiler; Canada Metal Company, Toronto, babbit, etc.; Conger Coal Co., Toronto, coal; Jenkins Valve Co., Montreal, valves; Coffin Valve Co., Boston, Mass., valves and gates; Cameron & Campbell, Toronto, inside trim and doors for building; Keith & Fitzsimmons, Toronto, plumbing; Lackawanna Steel Co., Buffalo, inter-locking steel sheet piling; Montreal Rolling Mills Co., Montreal, twisted steel reinforcements.

In the preparation of these articles the Contract Record has been greatly indebted to Mr. C. W. Dill, of Messrs. Dill, Russel & Chambers, the contractors; to Mr. F. F. Longley, engineer in charge of construction for the City of Toronto; and to Mr. Alfred Richley, superintendent of construction for the contractors, who assisted us greatly in the arrangement of the present article and furnished the greater part of the photographs reproduced herewith.

Deficiencies of Engineering Practice

Analysis of Contract Making and Enforcement—Unwarranted Severity with Contractors—The Engineer as Umpire and Moderator

THE relations existing between the engineer and contractor were discussed recently by Captain D. L. Hough in a comprehensive paper given before the first American Road Congress at Richmond, Va., and reproduced in our last number. In the United States this paper has aroused a considerable amount of interest in engineering and contracting circles. The following criticism is contributed to the Engineering Record by Mr. Robert G. Dieck, whose observations are particularly timely and suggestive in connection with Canadian field:

Captain Hough has attempted in a calm and rational manner to give a full analysis of the difficult question of contract making and enforcement. He is singularly equipped to approach the subject, for he has seen it from both sides and has experienced all the difficult situations that come to either contractor or engineer, in the conduct of engineering construction. The main point in his argument is that engineers, either through a certain professional pride or through over-zealousness, are unwilling, or at least unprepared, to admit that contractors may desire to give a fair return for money expended. In consequence of this and some notable failures in the past there has grown up about the whole subject of engineering contracts a dense hedge of checks and obstructions, which is now in need of some strong trimming. In this thought, delivered without heat, he seems quite on the proper road. With the progress of the years, the engineer begins to feel the deficiencies of his "practice," as Captain Hough so aptly puts it, and, perhaps with some feeling of hopelessness, looks about him for relief.

Excluding from attention the latter portion of the address, which concerns itself with the particular subject of road construction, and directing our argument to the general principles underlying the question of engineering contracts, he makes clear that the whole matter is in need of close attention. A short time ago Major C. E. Gillette addressed the American Society of Engineering Contractors on much the same subject, making a proposal of certain changes in the manner of letting and executing public contracts, and taking the general stand that the force of opinion of the engineering contractors would best serve to secure a betterment of conditions. Captain Hough, on the other hand, sees the necessity of attacking the matter from the other side and of arousing the engineering profession to a full realization of the present awkward state of affairs.

The great plea of both of these able writers, however, is for simplicity in contract drawing and elimination of useless detail. Many of the contracts proudly regarded by learned attorneys as structures of immense strength, indeed as Dreadnoughts in the contract field, are fortresses of clay, burdened with armor above the water line, but full of leaks below. It is my earnest contention that the least said in a contract, provided its full purpose be adequately set forth, the greater its strength. Of course, this implies that there will be shown intelligence and fairness in execution and that finally we must depend upon the honesty and good intention of the engineer to whom the work is committed. There never was drawn a contract that might not have been beaten if the intention were present.

It is probably not far from the truth to say that engineers as a class regard themselves as custodians of the interests of their principals, rather than as arbitrators in a problem in economics. For some time, thinking engineers have had an increasing sense of their deficiency in this direction and have been seeking a way out of their difficulties. The results thus far attained have been neither lasting nor of much real importance. Many of the profession seem to have failed signally to appreciate that burdensome difficulties placed in the way of contractors increase the cost of subsequent work and encourage efforts to circumvent exacting clauses in specifications. Contractors are in business for no particularly altruistic ends but for profit, and for as much of that as may be possible, so that a tendency to wreak vengeance upon or to break contractors will surely frighten away from bidding all but the cunning who feel that their power of deception will suffice to win the expected profit, in spite of imposed difficulties.

Suggested Modifications in Plans

Captain Hough makes the rather amazing suggestion that intending bidders be permitted to suggest modifications or at least to supplement the plans of proposed works, much as is the custom in tenders for the construction of naval vessels. The Navy Department does permit the submission of alternate bids on builders' designs, for the reason that certain requirements as to speed, steaming radius, coal consumption, etc., may perhaps be met in a better manner than has been determined upon by the naval constructors. However, it provides that, for uniform bidding, tenders be submitted upon the designs of the Department, reserving to itself the right to accept or reject any bid upon alternate plans. Such a procedure must evidently be the practice in governmental contracts, except in those particular cases where the building is upon work to accomplish a purpose under a bidder's design. The necessity for such procedure will, however, be rare, and each instance constitutes a special case. It is an undoubted fact that suggestions from experienced contractors are of considerable value, but it is difficult to see how such suggestions could be regarded seriously, if a suspicion of collusion would be avoided. In this era of great and widespreading investigation into governmental matters it would certainly be most unwise to adopt such a departure in method.

The Engineer as Umpire

It is the manifest duty of the engineer to preserve the calmest and most unbiased attitude in the enforcement of contracts under his control, and the tendency which Captain Hough remarks to visit upon contractors an unwarranted severity is most deplorable. Unless engineers come to appreciate their true function as umpires and moderators, they will have failed of their highest duty. As Captain Hough intimates, the publicly employed engineer is not usually a business man, and sometimes, through fear of criticism and a present desire to retain himself in office, takes steps against contractors which, upon leaving the service, make him ashamed. The public press unfortunately encourages contractor-baiting by carping criticism, and to avoid the chance of public disregard the engineer all too frequently allows his better judgment to be warped. The point taken, that it is a difficult matter to reverse the decision of a subordinate, is a good one, and it certainly requires nerve and determination to modify an order on appeal. Finally such a course must be guided strictly upon the merits of the case and if judgment be otherwise rendered the engineer will certainly lose in self-respect, however much he may have gained in "face."

In his role of umpire, there is an insistent call on the engineer to settle disputes as far as may be possible, without the aid of the courts. There are no doubt men in the profession who take a keen delight in the excitement of litigation, but such an attitude is cowardly. Certain contingencies may, however, arise which call for a court decision, and I seriously doubt if the great body of cases coming to the notice of the courts arise from other than the feeling that no reasonable solution may otherwise be reached. The large body of engineers is fair-minded and open to conviction, and it is unreasonable to place upon the profession the stigma of unfair dealing.

The reputation of the government contractor has, in general, been unsavory, but there is happily growing up the feeling that there has been much injustice done to him. The old generation of contractors who "feed at the public trough" is surely disappearing, except in some highly corrupt communities, and from the coming of technically trained men into the contract field I think we may date the era of good things. Corruption in public-works contracts has not generally been found in their execution under engineers, but in the letting, so that the breath of scandal has not touched the profession.

Investigation of Conditions

In the specifications for works requiring deep excavations it is usually stated that, although the plans may show the character of the materials to be encountered, no guarantee of the correctness of the information will be given, and that the intending bidder must satisfy himself of the true conditions. In operations where the item of excavation is small compared with the other work this clause causes little concern, but in large works of excavation where subsurface conditions are but imperfectly known the matter assumes considerable importance. It frequently happens that, though equipped with suitable apparatus for exploration, the bidder may not, through lack of time, conduct an adequate investigation. It is characteristic of ordinary American methods that work is entered upon without sufficient preliminary operations or full appreciation of difficulties to be overcome. Under our present political system, wanting so much in stability, it is not surprising that such should be the case in government work, since the temporary administrators desire for political reasons to make a reputation for energy and to point with pride to their achievements while in office, but slipshod methods have likewise been found in large corporations, which presumably ought to appreciate the wisdom of proper advance knowledge. This might not be so bad for the engineer except that he is made the scapegoat when disaster comes. It is high time that corrective measures be taken to save a growing mistrust in the eyes of the public, which has been treated in the past few years to an amazing number of failures in works of considerable magnitude. Protest may mean discharge, but if the profession is to advance there must be martyrs.

Concerning Guarantees

The requirement of guaranty of sufficiency of work by contractors is fortunately a rare one in engineering contracts. Besides being eminently unfair to the contractors, it is really a confession of fear for the result. This requirement may have taken its origin from a certain loss of confidence in engineers generally, as a result of the late disasters in great works under construction. It has been freely admitted that the failure of the Quebec bridge was due to defective judgment, but this failure would probably not have happened had there been less haste in rushing the construction. The writer is of the belief that, if the method of careful preliminary investigation were followed here which is the general practice among engineers in Europe, there would never be need of further considering this matter. At present the engineering profession is on trial, in a sense, and to be cleared of the charges of insufficiency, it must cure the evil within itself. Slovenliness in work will be no more tolerated in our profession than in medicine, and unless the profession be aroused to a full realization of its deficiencies it will continue to stagger along in its present somewhat discredited rut.

1911 a Great Building Year for Canada

An Expenditure of Nearly One Hundred and Twenty Million Dollars for Twenty-two Cities - Proportionate Increase of 20 per cent.

The twenty-two principal cities of the Dominion expended nearly one hundred and twenty million dollars on building during 1911, as shown in the accompanying table. The proportionate increase on the grand total for these cities over that of the preceding year was 29 per cent.

Toronto, with an outlay of more than twenty-four million dollars and an increase of 15 per cent. over 1910, easily maintains the lead. A feature of Toronto's business in this as in other departments, is its stability. The increase shown is in practically the same ratio as 1910, whose percentage gain over 1909 was 16.

Town or City	Dec. 1910	Dec. 1911	12 mos., '10	12 mos., '11	Approx. Inc. per cent.
Toronto	$1,353,265	$1,791,032	$21,127,783	$24,374,539	15
Vancouver	958,775	1,592,485	13,150,365	17,652,642	34
Winnipeg	970,250	206,550	15,116,450	17,550,400	16
Montreal	756,800	622,422	15,715,859	14,759,632	6*
Calgary	354,300	698,160	5,589,549	12,908,638	131
Regina	20,625	71,230	2,351,238	5,099,340	117
Saskatoon	177,875	134,125	2,817,771	5,004,326	77
Hamilton	49,550	92,300	2,604,605	4,255,730	63
Victoria	131,750	242,350	2,273,045	4,026,315	77
Fort William	424,135	589,400	2,381,125	3,077,860	29
Ottawa	174,350	195,060	3,022,650	2,997,610	1*
St. Boniface	5,600	102,550	861,870	1,140,735	32
London	63,085	187,553	805,074	1,036,880	29
Lethbridge	35,450	112,750	1,211,310	1,033,380	15*
Sherbrooke	30,000	20,000	500,000	1,000,000	100
Windsor	22,700	81,150	392,040	739,515	89
Port Arthur	76,800	9,495	892,681	597,705	33*
Halifax	14,345	98,000	630,380	508,796	19*
Sydney	12,800	9,000	347,554	495,642	43
Strathcona	10,200	12,925	363,470	491,403	35
St. Thomas	10,150	2,100	286,400	285,575	—
Stratford	1,000	500	224,000	113,000	50*
Totals			$92,665,219	$149,149,663	

Proportionate increase on totals for above cities 29 per cent.

*Decrease

Vancouver in second place, with an expenditure in excess of seventeen and one-half millions, is run very close by Winnipeg, whose total is some one hundred thousand dollars less. The fourth position falls to Montreal, where strangely enough a decrease of 6 per cent. is recorded. It may be well to mention the fact that the total for Greater Montreal is twenty-seven and one-half million dollars. To the cities next in order, Calgary and Regina, fall the honor of the largest percentages of increase—Calgary with 131 per cent. and Regina with 117 per cent. The figures for Calgary are particularly illuminating as to the remarkable development of that city. Saskatoon, with a gain of 77 per cent., shows the same rate of progress as Victoria, while the "ambitious" city of Hamilton is sandwiched between the two with an expenditure of four and one-quarter millions. The Federal Capital would appear to be recovering under the new regime. In 1910 the decrease shown was 33 per cent. The 1911 total is almost stationary.

The remarkable progress made in the building development of this country may better be realized by a comparison of the 1911 total with that of 1909, which was $65,459,456. This represents in two years a percentage gain of 82.

In a number of instances the returns of smaller cities have not been sent to us, despite repeated applications on our part. In these cases it is only fair to assume that the building total is either small or that there is a notable decrease, a knowledge of which the building inspector would prefer to keep to himself. One always encounters such concealment, or shall we say reticence, in the preparation of statistics. For these cities, for the towns and for numerous places generally where building permits are not issued, it would perhaps be fair to add 15 per cent. to the above total. Adding in the thirteen millions for Greater Montreal this would give a total of something like one hundred and fifty million dollars for the whole of the Dominion, which may be regarded as a pretty close figure.

City Engineers and Building Inspectors are requested to send The Contract Record detailed monthly statements of building and civic development.

Optimistic Reports from Many Cities

Mr. J. W. Fugler, Building Inspector, North Vancouver, B. C., reports the total building permits issued by that ctiy last year as representing a value of $772,468.

"There is a feeling of optimism here such as has not been experienced for several years. There is every reason to believe that we shall make a record in 1912."—H. W. Meech, Building Inspector, Lethbridge, Alta.

"Trade and labor conditions are good. At the present time it looks as if last year's business would be surpassed. There are three or four large industries making arrangements to establish in Sherbrooke. These will naturally give an impetus to the building trade."—T. J. Griffith, Building Inspector, Sherbrooke, Que.

"Many new business blocks are planned for 1912. Labor was very scarce in 1911. The building figures last year do not include large amounts spent by the Dominion Iron and Steel Company, Limited, in new construction."—City Engineer Campbell, Sydney, N.S.

"Trade was good during the past year. Building has not increased but has maintained an even volume for several years. Our growth and prosperity are assured. Labor conditions are such that there are few complaints. There has been sufficient labor to meet the demand generally." —J. P. Frank, Assessment Commissioner, St. Thomas, Ont.

Building Inspector Macnamara, of Fort William, Ont., writes us:—"I have pleasure in reporting, that for the first time in the history of Fort William, the building returns are over the three million mark, although the year was recognized as a quiet one generally. The enterprises entered into locally prove the optimism of the promoters. There is every sign of a prosperous year ahead. Over $2,000,000 worth of work will be started as soon as weather conditions permit and I expect the returns for the year to produce another record-breaker. Labor conditions all round are good."

Conditions at Regina are summed up by Mr. O. F. Falls, Building Inspector, as follows:—"The past year has been a banner one in the history of Regina and the prospects for the coming season are very bright. Several large buildings will be commenced as soon as weather conditions permit. Trade and labor conditions during the past season were very satisfactory."

Mr. J. E. Harrison, Building Inspector of Saskatoon, Sask., writes us:—"The prospects for the coming year are exceptionally bright. Tenders have been called for several large residential and business blocks, also several warehouses and residences. Business is particularly good in all parts of the city."

Mr. Arthur E. Nutter, City Architect of London, Ont., writes the Contract Record:—"Nineteen hundred and eleven has been a record year and there is every prospect of 1912 surpassing it. The new City Hall will probably be commenced, and new stores and office buildings will be erected to replace those recently destroyed by fire. There is every indication that improvements to erecting buildings and residential work will be as brisk as in past years. Trade has been good and should improve. Labor conditions are excellent."

Mr. S. H. Jarrett, Building Inspector at Vancouver, writes:—"Labor conditions appear to be settled. I do not anticipate any trouble during the coming year. The prospects for building were never better. Plans are now on file for inspection aggregating a million dollars and many large buildings are contemplated. The outlook is for a big year."

The building permits issued last year at New Westminster, B. C., represent a total value of $1,326,671. This is the best record in the history of the city. The city's building by-law did not go into effect until late in February, otherwise the total would have been larger. The outlook for 1912 is reported excellent.

In a recent communication to the Contract Record, Mr. F. W. W. Doane, City Engineer of Halifax, states that during the last few months labor conditions in that section have been more than usually favorable. A number of important works are either under contract or contemplated at Halifax and the outlook for the coming year is promising. The buildings under construction include two banks, and a one million dollar terminal pier is in course of erection. The city has the usual work in contemplation and in addition the construction of a reservoir and garage incinerator. The street railway company are planning extensions of their lines and double tracking.

Government Estimates

Estimates totalling nearly $150,000,000 have been tabled at Ottawa by the Hon. W. T. White, Minister of Finance.

On capital expenditure a total vote of $44,870,372 is asked, of which $25,000,000 is for the National Transcontinental Railway; $3,000,000 for the Quebec bridge; $2,000,000 for the Hudson Bay Railway; $4,158,350 for capital improvements on the Intercolonial Railway, including $1,000,000 for the branch line from Dartmouth to Dean's Settlement; $900,000 for docks and wharves at Halifax, and $400,000 for new rolling stock.

For the Welland ship canal there is a vote of only $50,000 for surveys, while there is no vote at all for the Georgian Bay ship canal. Any policy which the Government has with regard to these projects will await announcement in the supplementary estimates. Capital expenditure on public works provided for totals of $5,185,000, the main items being Ottawa departmental buildings, $780,000; Port Arthur and Fort William Harbor and River improvements, $1,000,000; Quebec harbor, $716,000; St. John harbor, $1,000,000; Tiffin harbor, $137,000; Victoria harbor, Ont., $160,000; and Victoria and Vancouver harbors, B.C., $500,000 each.

Mr. J. Campbell, chief city accountant of Montreal, has prepared a report showing the amount held by the city belonging to contractors who have unfinished work for the council. This totals $421,869, and represents contracts to about ten times that amount. During the year deposits totalling $171,273.15 were refunded. The principal deposits on hand are those of Mr. F. H. McGuigan, for $113,500, and of Haney, Quinlan & Robertson, for $100,000. These contractors are engaged on the new filtration plant.

In the Superior Court, Montreal, Mr. Justice Greenshields heard an action brought by Mr. R. J. Dwinnell and others against Mr. Samuel Carsley for alleged non-failure to form a company for exploiting a smoke-consuming device. Damages of $29,000 were claimed. It was alleged that Mr. Carsley had agreed to take over Mr. Dwinnell's obligations in the promotion of the company, and had failed to do so. It was also claimed that the agreement ought to be cancelled. The judge intimated that he was not satisfied as to the claim, and as the company had never been formed, the action became one of damages. He reserved judgment.

The Portland Cement Contracting Company has commenced operations on the erection of a million-dollar plant at Todd Inlet, Vancouver Island. This is within a few miles of the Vancouver Island Portland Cement Company's plant, established several years ago.

Civil Engineers' Convention at Montreal

All Preparations Now Completed for the 26th Annual Meeting of the C. S. C. E.—Great Gathering Assured—Transportation Arrangments

It goes without saying that widespread interest is being taken in the forthcoming convention of the Canadian Society of Civil Engineers. The convention, which is to be held at headquarters, Montreal, will be the twenty-sixth annual meeting of the association and will be held at the Society's headquarters at 413 Dorchester street west, a photograph of which is reproduced herewith. The meeting will last three days and the arrangements that are being made ensure interesting sessions and valuable discussions.

City Engineer Rust, of Toronto, President C.S.C.E.

Professor C. H. McLeod, Secretary of the Society

On the morning of Wednesday, January 24th, there will be a meeting for the nomination of scrutineers, receiving the report of council, reception and discussion of reports of committees and the transaction of the general business of the Society. At 1 p.m. a luncheon will be held in the Windsor Hotel, Montreal, at the invitation of the Montreal branch. The afternoon will be devoted to the address of the retiring president, City Engineer Rust, of Toronto, and to an address by Dr. H. T. Barnes, on Iceberg Detection in Navigation. The latter will be given in the Lecture Hall of the Chemistry Building at McGill University. At 9.30 p.m. there will be a reception by the President and Members of Council in the Engineering Building at McGill University.

On Thursday, January 25th, two parties will be formed for the purpose of visiting engineering works—one to the Angus Shops and the other to the works of the Dominion Bridge Company and the Canadian Car & Foundry Company. The Annual Dinner of the Society will be held in the Windsor Hotel at 8 o'clock on Thursday evening.

Headquarters of The Canadian Society of Engineers at 413 Dorchester Street West, Montreal

On Friday, the last day of the convention, there will be a meeting at 10 a.m. for the reception of reports of scrutineers and conclusion of business. A meeting of the Council will be held at three o'clock in the afternoon.

By the kindness of the Railways of the Eastern Canadian Passenger Association, Members and their families who have paid a full one way first-class fare going to the meeting in Montreal, will be returned free on presentation of a Standard Convention certificate signed by the ticket agent from whom a ticket has been procured at the point of commencement of the journey. The certificate is to be endorsed by the Secretary of the Society and vised by a special agent of the Passenger Association who will be in attendance at the meeting from 3 p.m. to 6 p.m. on Wednesday and Friday, January 24th and 26th. Tickets may be purchased and are available three days before the commencement of the meeting, and the return journey may be made three days after its conclusion.

The Canadian Pacific Railway and the Canadian Northern Railway will grant a further extension of time to persons residing west of Fort William, making this free return available for 15 days after the close of the meeting; the ticket to Montreal having been purchased at any time and receipt obtained therefor on the Standard Convention form.

Canadian Consulting Engineers

Colonel Tracy, Vancouver

Colonel Thomas H. Tracy, of Vancouver, was born at London, Ont., in June, 1848. His parents were natives of Wicklow, Ireland. He was educated at the "Old Central School" of London, Ont., and was apprenticed at the age of sixteen years to Mr. William Robinson, City Engineer. Upon the completion of his indentures he obtained an appointment in the Public Works Department of Ontario under the late Sir John Carling and Mr. Tully, Chief Engineer In 1872, at the age of twenty-four years, he went to Chicago and remained in that city for some time during its reconstruction after the great fire. From Chicago he went to Albany, N. Y., where he was engaged for a time in the office of Thomas Fuller, Architect of the State Capitol and also of the Parliament Buildings at Ottawa. In 1873 he returned to London, Ont., and entered into partnership with Mr. Robinson, with whom he had served his apprenticeship. In 1878 he was constructing engineer on the London waterworks. Upon the completion of the latter project and upon the retirement of Mr. Robinson, he was appointed City Engineer, a post which he retained until 1891, when he accepted a similar position in Vancouver, B. C. He served in the latter capacity for fourteen years, during which time he effected many noteworthy improvements in the new city, among which may be mentioned the remodelling and extension of the waterworks. Since 1905 Colonel Tracy has been engaged in private practice as a consulting engineer.

Colonel Tracy, Vancouver

As one might assume, the professional phases and developments of Colonel Tracy's life are not the only ones of interest. He has achieved distinction in many other ways. He participated in the Fenian Raid campaign of 1866-7 and again joined the volunteer force in 1884. During the North-West Rebellion of 1885 he served as captain in the 7th Fusiliers. A few years later he was promoted to the rank of lieutenant-colonel and retired subsequently with this rank. He is prominently identified with the Masonic Order, in which he attained a high position in the Grand Lodge of Canada. His son, Leonard, is a second-year science student at McGill University.

Municipal Activity at Montreal

The engineers' department of the Montreal council executed a large amount of work during the past pear. Mr. Janin, the chief engineer, had under supervision the extension to the intake pipe for the water supply, the enlargement of the aqueduct, and the commencement of the filtration plant, all these large works being carried out by contract. About seventy thousand square yards of permanent sidewalks were completed, half in asphalt and half in cement, the total cost being $230,000. Some 135,000 square yards of street paving were laid at a cost of $530,000. The work was divided into 34,000 square yards of Scoria blocks, 26,000 square yards of granite, 60,000 square yards of asphalt, and the balance of various other material.

City Engineer Janin, of Montreal

"Chain Belt" is the name of an interesting publication which will henceforth be issued monthly by the Chain Belt Company of Wilwaukee, Wis. The primary object in getting out this periodical is to bring the firm in closer touch with its customers but in any case the booklet is one which is worth perusal by contractors and others interested in concrete construction. Copies will be mailed free upon request. Every effort will be made to improve the publication and to make its contents as interesting and practical as possible.

Canadian Contractors and Their Work

The Operations of Messrs. Wells & Gray, Limited, Toronto
Interesting Features of Numerous Contracts carried out in 1911

THE wonderful progress made in Canada during the past few years is indicated perhaps most clearly by the amount of work handled by the engineering and contracting firms, which are rapidly increasing in number and importance. The great natural resources of Canada, with its rapid industrial development, offer probably the best field in the world for firms of this class, who not only have the organization and plant necessary for carrying out large contracts, but also have sufficient engineering ability and experience to enable them to design such structures and successfully cope with the difficulties encountered in the progress of the work. The great variety of work which can be handled to advantage by an engineering and contracting firm is well illustrated by the contracts carried out by Wells & Gray, Limited, during 1911.

Concrete Work at 20 Below

One of their contracts was for a power house and transformer house at Dam No. 2, Trent River, near Trenton, Ont., for the Sydney Electric Power Company. These buildings are of red pressed brick with stone trimmings. They are fireproof throughout, being constructed of structural steel with reinforced concrete floors. The work was carried on through the winter, no difficulty being experienced with the earth and rock excavation. In doing the brick work only ordinary precautions were taken. The concrete work, however, required careful attention; not only were all materials warmed, but after the concrete was placed steam pipes were placed on both sides of concrete and packed in straw, after which it was covered with canvas. Steam was kept in these pipes for three or four nights and days, after which it was found that the concrete had set sufficiently so that no damage would result from frost. Part of this concrete was placed when the temperature was 20° below zero. The buildings were designed by Messrs. Smith, Kerry & Chace.

The Wilton avenue bridge in the city of Toronto was completed during the spring of 1911, the reinforced concrete floor having been left over from the previous year. This bridge, which was designed by the City Engineering Department, was described at length in a former issue of the Contract Record by Mr. R. Chadwick, who had charge of the work for the city.

Another job carried out by the firm during the winter was a brick station for the C. P. R. at Guelph, Ont. The new station is about a quarter of a mile further north than the old station and is considerably nearer the business portion of the city. No particular difficulties were encountered.

Early in the spring of 1911 the company built a freight car repair shop for the C. P. R. at Keele street, West Toronto. The building is of pressed brick and steel construction.

Photographs reproduced on another page show the construction of a reinforced concrete warehouse for the International Harvester Company, at Chatham, Ont. The building is 100 feet square, five storeys and basement in height. The excavation being in quicksand occasioned a good deal of trouble, especially since there was a railway siding close to one side of the new building and other buildings close to the other sides. In order that this excavation could be done without disturbing other buildings, etc., it was necessary to shore up the sides of the excavation carefully, and since there was not room for ordinary shoring, piles were driven ten feet apart all around the building. Horizontal timbers were then bolted to the piles and 3-inch plank driven down behind these timbers. The foundations were carried down to a bed of clay underlying the quicksand. The building is of the flat slab reinforced concrete type without beams. Columns are spaced 20 ft. 0 ins. on centres, floors designed for 200 and 350 lbs. per square foot. The rough slabs are 8 in. and 9 in. thick, with 1½-in. finish additional. The reinforcing steel is shown in one of the accompanying photographs. The roof is 7 in. thick and is designed for a live load of 40 lbs. per square foot. The building was completed in fifteen weeks after excavation was done.

Walker Sons' factory building at Walkerville, is of reinforced concrete, about 65 ft. x 120 ft., three storeys. The floors are designed to carry a live load of 125 lbs. per square foot. Construction was of ordinary beam and slab construction, the reinforcement used being cold twisted square bars. The floors are all hard maple laid on 2 x 3 bevelled sleepers, 16 in. centres, these sleepers being bedded in concrete. The curtain walls are of dark red semi-vitrified brick, which forms a contrast with the exposed concrete beams and columns, giving a very pleasing appearance.

The Company also designed and built a reinforced concrete factory for the Leather Label Over-Haul Company, at Walkerville, Ont. The construction was almost identical with the Walker factory, except that common brick were used for the curtain walls, and that the floors have cement finish instead of wood.

The Jane Street Subway for the C. P. R. at West Toronto, is 290 feet long and contains 3,200 cu. yds. of concrete. The chief feature of this work was the necessity for getting the work done quickly, all concrete being poured in seven weeks.

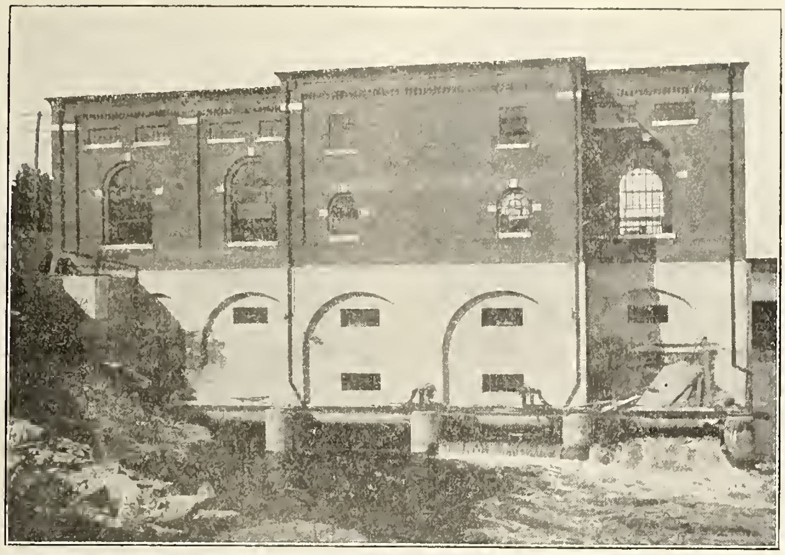
The Runnymede Road Subway for the C. P. R. at West Toronto is 380 feet long and is constructed somewhat differently from the Jane Street work. Instead of having only two large abutments with wing walls, there were two abutments and two retaining walls with sidewalks on each side between retaining walls and abutments. The sidewalks are elevated about six feet above the roadway.

A small brick factory was also built for the Dominion Stamping Company, Limited, at Walkerville, Ont.

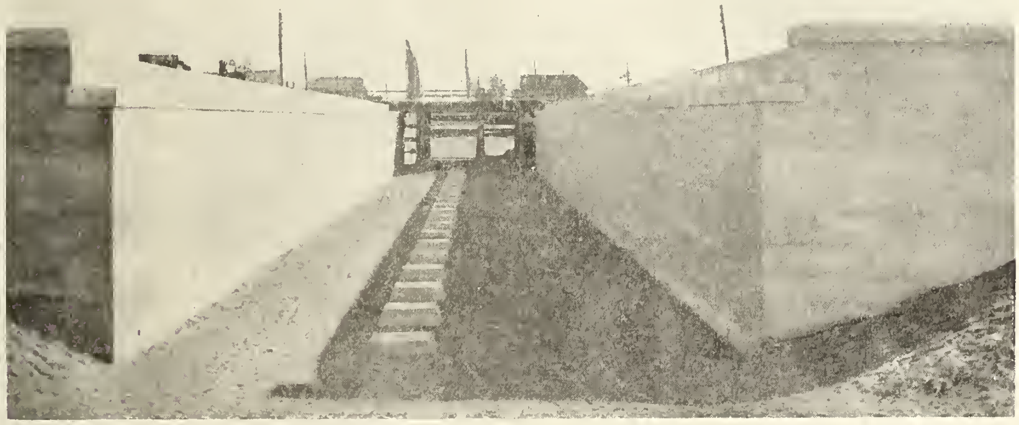
Ford Motor Company's Buildings

Probably the most interesting work from an engineering point of view was done for the Ford Motor Company, at Walkerville. This work consisted of three buildings. The Heat Treatment building is a one-storey structural steel building, with brick curtain walls and fireproof windows, the roof being made of reinforced concrete tile.

The office building, seen to the left of the accompanying picture, is of reinforced concrete, 40 ft. x 120 ft., two storeys. The floors are designed for a live load of 75 lbs. per square foot, the reinforcement used being cold twisted square steel bars. All concrete beams and columns are veneered with semi-vitrified brick with cut stone trimmings and cornice. The interior of the building is lined with hollow tile and the whole plastered, the ceilings being of metal lath and plaster, suspended. The floors of the main



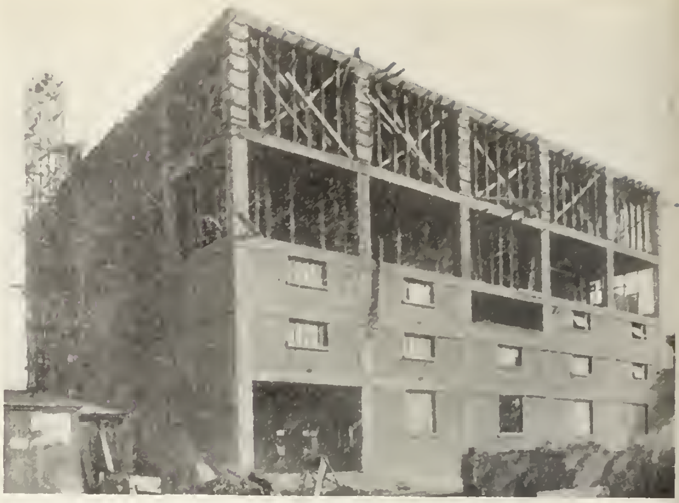
Power house erected at Trenton, Ont., for the Sydney Electric Power Company.



C. P. R. subway at Jane Street, West Toronto.

C. P. R. freight car repair shop, West Toronto.

International Harvester Company's building at Chatham, Ont., showing reinforcing steel in place.



International Harvester Company's building in course of construction.

office are of quarter sawn oak, as is also all trim and office partitions. The building is equipped with up-to-date ventilating and heating systems.

The main factory building, built this year, may be seen at the right of the accompanying picture. The building is 75 ft. wide across the end shown in this picture, while it is 200 ft. long. The building is of reinforced concrete throughout, with hard maple floors, red brick curtain walls, and fireproof windows. The columns are 25 feet apart in one direction and 22 feet apart in the other direction. Floors are designed to carry a live load of 125 lbs. per square foot.

This whole building is built out over the Detroit river and is supported entirely on wooden piles, about 700 piles being necessary. Piles 35 feet to 40 feet in length were driven and cut off one foot below water level. Sheet piling was then driven around each cluster of piles and concrete foundations poured around and over piles. The concrete was allowed to go down around the piles to the bottom of the river, the water being from 2 to 4 feet deep

The chief difficulty encountered was that there was no sufficient support for the form work for the ground floor. This was overcome by using steel I-beams, designed strong enough to support the entire dead load of the floor, the form work for concrete being wired to the steel beams. These steel beams were placed in such a manner that when concrete was poured around them they formed the reinforcement of a concrete beam, which when the concrete set was strong enough to carry the total dead and live loads. After this floor was in place the other three floors and roof were built in the usual way. The second floor was poured within two weeks of the ground floor, and each succeeding floor was put on in ten days. Each of these floors weighed 130 lbs. per square foot, so that at the end of six weeks there was a total load of 650 lbs. per square foot. It is hardly possible to tell how much of this was carried by the first floor without any support underneath it. However, observations were taken on the beams of this floor after each floor above was poured and at no time was there any appreciable deflection.

Messrs. Wells & Gray have just completed an ice house for the Swift Canadian Company. The building is of timber construction with reinforced concrete foundation walls. These foundation walls are designed as retaining walls, part of the basement being used for salt storage.

Information relating to the expenditure on roads is given in the annual report of the Quebec Minister of Agriculture. Figures show that in 1901 and 1902 the amount expended on roads was only $6,000. Since then the amount has been steadily increasing. In 1907 there were 1000 miles of road kept in repair by the Government, and in 1911 the total was 9000 miles. In 1908 five hundred and thirty-two acres of road were gravelled; in 1911 twelve hundred and sixty acres. In 1908 two hundred and twenty-four acres were macadamized, and last year eleven hundred and twenty acres.

Leather Label Over-Haul Company's factory under construction at Walkerville, Ont.

To the left, Ford Motor Company's office; to the right, the company's factory building—built out over Detroit River.

A Great Engineering Project at Montreal

C. N. R. Entrance to City by means of Tunnel under Mount Royal—Estimated Expenditure Twenty-five Millions

THE biggest engineering project having any relation to the City of Montreal is about to be undertaken in connection with the terminals of the Canadian in the construction of a tunnel under Mount Royal Northern Railway. A preliminary interview took place on January 9th between representatives of the railway and the Montreal Board of Control when plans were laid before the latter body and the intentions of the company stated on broad lines. The company will shortly submit in writing for the information of the controllers, city engineers, and aldermen, detailed plans and description of the work they propose carrying out here. The representatives of the company included Messrs. W. H. Moore, secretary; H. K. Wicksteed, engineer; Colonel A. D. Davidson, land commissioner, and Thomas Darling.

According to the present plans, practically the whole of the Island section of the line will be electrical. The track from the Back River to the point where it enters the mountain on the north side will be raised on an ordinary earthen embankment to an average height of seven or eight feet. This will enable the company to make subways at all street crossings without making much of a depression below the street levels. The water at the Back River is about forty-five feet above sea level, whereas the mouth of the tunnel is 175 feet above. The height of the bridge, and the track at the river bank, is such that an upgrade of forty feet per mile for the two miles between the river and the entrance to the tunnel gives the right elevation at the latter point. The tunnel will be three miles long and the underground approaches about a quarter of a mile additional, which will make this the longest tunnel in Canada. Most of this tunnel, it is believed, will be through solid rock. The width of the tunnel will be thirty feet and the height about twenty-five, and it will be double tracked, The shape will be similar to that of the ordinary bake-oven with a flat bottom, perpendicular sides and a slightly arched roof. There will be a decline in the grade of the tunnel itself, from the north end to the mouth, of about thirty-two feet to the mile; consequently the mouth of the tunnel will be about 100 feet lower than the entrance. According to the company's engineer the part of the tunnel running through solid rock will consist of a single tube, but where earth is met with and it is found necessary, double tubes will be constructed.

The viaduct from the mouth of the tunnel to the harbor front will start at Lagauchetiere street and have an elevation over St. Antoine street, St. James street, Notre Dame street, Hay Market Square, William, Ottawa and Wellington streets, varying from 16 to 20 feet. This viaduct will be constructed of steel and concrete. Much of the rock obtained from drilling the mountain will be used in its construction, but the company expects to have a large quantity of rock to sell suitable for concrete and macadam work. The engineers have given the assurance that less noise will be caused by trains running over this viaduct than by the ordinary street cars and there will be a minimum of vibration. It is said that the sides of the viaduct will be of such a height above the tracks that only the tops of the cars will be seen from the street and the intention is to give the viaduct as artistic an appearance as possible.

While the exact plans of the company have not been announced, for the reason that the final decision has not yet been reached by the officials themselves, pending the return to Canada of Sir William Mackenzie, it is considered certain that the railway station and a large hotel will be situated on the property recently acquired, bounded by Cathcart, St. Monique, Lagauchetiere and Mansfield streets. Reports have stated that the hotel would probably be situated on the north side of Dorchester street and the station on the south side, but a statement made by one of the company's representatives, to the effect that they wish to have the station near St. Catherine street as possible, affords ground for the belief that the station will be erected between Dorchester and Cathcart streets. It was stated by the same official that the company was not committed definitely to a hotel project, although such a scheme would probably be developed. Where it would be situated could not be stated. A preliminary draft of the perspective view of the station has been made and shows a magnificent building which will be an ornament to this important centre. The company's engineer in speaking to a representative of the Contract Record & Engineering Review declared that on account of the line being operated entirely by electricity the interior of the station could be kept as clean and attractive as the parlor in a private house and no expense would be spared to make it one of the finest buildings of its kind in the Dominion. The ticket office and waiting rooms will be some ten feet below the level of Dorchester street, while the tracks will be about forty-seven feet below. The trains will be reached by easy stairs and wide corridors, all lighted, heated and ventilated by the most modern system. The foundations of the station and other buildings will rest on bed rock. It is expected that at some future time a tunnel will cross the city from east to west either under St. Catherine street or Dorchester street and it is calculated that there will be space enough between the city's drainage system and the C. N. R. tunnel for the cross tunnel system to pass through. Provision is being made in the company's plans to connect their railway station with this cross tunnel which they expect will cross their line within a very short distance of their station.

Operations to Commence in the Spring

Boring will start at both ends of the tunnel at the same time and it is expected that operations will be commenced early in the spring. The tearing down of the buildings now standing on property recently purchased for the company's right-of-way within the city limits and for the erection of freight sheds and other terminal facilities will begin as soon as possible after the first of May, when the company takes possession of the newly acquired property. The tunnel is expected to be in operation within three years and the terminal accommodation must also be ready at that time.

The tracks will come into the city about under the mountain lookout near the head of Peel street where they will be about 700 feet below the lookout; 200 feet below the level of Pine avenue and 80 feet below Sherbrooke street.

Just how the connection will be made between the C. N. R. line and the tracks on the harbor front, controlled by the Harbor Commissioners, is not yet known, as the matter has not yet been taken up by the company's officials with the Harbor Board. It is considered probable that elevated trackage along the harbor front will be provided as there is a prospect of congestion at that point owing to the great increase in export business.

The company's freight sheds, according to present plans, will be situated on the site bounded by William, Nazareth, Dalhousie and Wellington streets.

In the district north of the mountain the large area in the vicinity of the entrance to the tunnel comprises a tract of land about a mile square, having no roads running across it in any direction. This is destined to be the site of the company's shops. The strip of land adjoining this block on the north side will be reserved for residential purposes, principally for the employees of the company. The railway line runs through the centre of this strip and a station will be planted at a convenient point. Other blocks of land indicated on the map as being the property of the company between the mountain and the Back River will be built upon with stores and residences, churches, schools and other buildings that will be required by a population which, it is estimated, will in a few years reach anywhere from fifty to one hundred thousand souls. This will constitute the much talked of model city.

It is the intention of the company to build a freight line from a point in St. Laurent to Longue Pointe along the northern portion of the Island coming out at Molson's Creek, which empties into the St. Lawrence below Maisonneuve. This branch line will also connect with the present Canadian Northern Quebec Railway line running into the Moreau street station in the east end. Shunting yards and a divisional point will be established somewhere between Mount Royal and the bridge across the Back River where the Toronto and Ottawa lines will branch out.

The entire scheme involves an expenditure of approximately $25,000,000.

Annual Banquet of Montreal Builders

The Most Successful in the History of the Exchange — Noteworthy Utterances of Prominent Public and Business Men

THE Montreal Builders' Exchange held their annual banquet in the Windsor Hotel, Montreal, on Tuesday, January 9th. Mr. James Ballantyne, president of the association, presided. At the president's table were seated the Hon. Louis P. Pelletier, Postmaster-General; the Hon. Rodolphe Lemieux; ex-Postmaster-General; Hon. Dr. Sproule, Speaker of the House of Commons; Mr. H. B. Ames, M.P. for St. Antoine division; Mr. William Rutherford, Mayor of Westmount; Mr. Alcide Chausse, Building Inspector; Mr. Thomas Gilday, Mr. W. T. Castle and Mr. John Quinlan, Directors of the Exchange; Mr. C. C. Ballantyne, Harbor Commissioner; Alderman Sherrard of Westmount, Chairman of the Canadian Manufacturers' Association; Mr. J. Rawson Gardiner, President of the Province of Quebec Architects' Association; Mr. Alexander Prud'homme, representing the Chambre de Commerce; Mr. N. Simoneau, President of the Electrical Association of the Province of Quebec, and Mr. J. H. Lauer, Secretary of the Montreal Builders' Exchange.

At the close of the dinner the chairman proposed the toast of "The King," which was honored loyally by the assembly of some one hundred and eighty members and friends of the Exchange.

Mr. Ballantyne announced that after long deliberation the committee in charge of the matter had succeeded in drafting a model contract which it was hoped would be satisfactory alike to architects, contractors and proprietors. He also referred to what he termed unfair competition from American contractors and advocated an increase in the tariff on cut stone. The Americans he said were coming to Canada and getting some of our best contracts and he thought it was not too much to ask that a moderate amount of protection should be given Canadian artisans.

An Expenditure of Three Hundred Millions

"Building up a Great Country," was the toast proposed by the Hon. Dr. Sproule. The Builders' Exchange, he said, was one of the most important institutions having to do with the progress of the country. Canada spent last year some $300,000,000 in buildings and it was anticipated that 1912 would see an increase of fifty millions. This meant industrial growth for the nation, business for the transportation companies and wealth for the laborer. The products of the mine, the forest and the field were touched upon in detail, some interesting statistics being given, including the fact that the turnover represented by the Manufacturers' Association during last year amounted to something like one billion dollars. The Builders' Exchange was trying to make better artisans; to elevate their standing in life and to provide more comfort for the thrifty citizens of which our country could boast. Notwithstanding all that had been done there were still many problems to be solved.

As one who had been in parliament for some time he had seen appeals made to the parliamentary representatives to help labor unions in obtaining better conditions. He had also studied with some interest the methods of carrying on strikes and had watched the results of the agitations. His decision was that labor had not always taken the best means to obtain its object. He could not feel that it was right for employees to take employers by the throat: as for instance, when an ocean liner was in port unloading as quickly as possible to get away on the return voyage; or to hold up building operations when winter was close at hand or when help was scarce and the completion of a contract urgent. Satisfactory settlements were never attained by strikes. A strike did no good either to the labor unions, the employers, the families of the working men, or the country at large. He thought a better way would be for labor and capital to get together when their representatives were good natured and the situation could be weighed upon its merits, each seeking to co-operate with the other for the benefit of all.

Looking to Improved Transportation Facilities

The Hon. L. P. Pelletier, in responding to this toast spoke of the transportation facilities existing and required to carry the vast products of Canada to the sea and across the ocean. He spoke of the necessity of improving the St. Lawrence even more than had been done in the past and also of increasing the terminal facilities in Montreal and other seaports. The aim of all Governments should be to provide these facilities. One thing that militated against the popularity of the St. Lawrence route was the high insurance rates exacted by the underwriters. Shippers to and from the port of Montreal were in the hands of Lloyds. He could not speak officially for the Government, but personally he would encourage the establishment of a Canadian Lloyds and he asked if the time had not come for wealthy

Canadians interested in this matter to establish such an organization. There would, of course, be considerable risk in such an undertaking, but he believed it worthy of serious consideration and felt confident that the Government would help in the matter.

Mr. H. B. Ames also replied to this toast. He remarked that politicians could learn something from the builders; the Government should build on a broad and far-seeing system; they should not carry on their work for the sake of giving a fine appearance to the facade of the political structure. About every four or five years the work of the politician was inspected and it did not always stand examination. Old timber had to be removed and weak planks replaced, otherwise a crash might result and somebody would suffer. Stability and symmetry should mark their operations. The time had come, he believed, when Canada could afford to make a more careful choice of the immigrants that she would admit as citizens of this great country. There was no society in Canada, he believed, that could do so much to bring about better relations between employer and employee as the Builders' Exchange. Legislation could not do everything in this regard; it could only stand by as an impartial arbiter.

"Building up a Worthy Metropolis" was the toast proposed by Mayor Rutherford, of Westmount. His worship paid a worthy tribute to the Mayor of Montreal, commenting on the good work done under the administration of the Board of Control during the past two years. Faithful and intelligent work was necessary to the building up of the commercial metropolis of Canada in a manner that would make it an example to all its sister cities and to the world. This toast was responded to by Mayor Guerin and Mr. C. C. Ballantyne.

Montreal's High Destiny

Mayor Guerin said that he believed Montreal was destined within the next few pears to grow faster than any other city on the North American continent. No commonplace structure should be erected within its limits. Twenty-seven million five hundred thousand dollars were spent last year in buildings in Montreal, this being about nine per cent. of the cost of all the buildings erected in Canada within that period. The Mayor emphasized the necessity for planning the outskirts of the city, which were rapidly becoming thickly populated, so that they would have the advantages of air and plenty of light. To this end he advocated the appointment of a commission invested with power to direct the layout of the suburban sections of the city and he hoped the citizens of Montreal would encourage Sir Lomer Gouin, Premier of the Province, to introduce and pass a bill with this object in view during the present session of the legislature. His Worship concluded with a brief reference to the entrance of the Canadian Northern Railway Company's western line into the city and the immense terminal facilities that were projected for Montreal.

Mr. Ballantyne spoke principally on the development of the port giving credit to the late Government for the generous and whole-hearted assistance which had been given to the undertaking, particularly since the appointment of the present commissioners. Although much had been done, the existing facilities were still inadequate to meet the demands. More wharfage space was required: if they had a half a dozen more sheds ready for the opening of navigation they would all be occupied. The same thing was experienced in connection with the commissioners' elevators. The first one was erected to hold a million bushels of grain; on completion it was found to be far from sufficient to meet the needs. Elevator No. 2 was planned to hold 1,700,000 bushels, but before it was completed it was found that this capacity was too small and additional space for 886,000 bushels was now being provided. Doubtless other elevators would be required later. Mr. Ballantyne advocated the appointment of a commission to study the transportation and terminal facilities of the Dominion, mentioning the Pacific ports and the Hudson Bay route as well as the St. Lawrence, all of which should be equipped as rapidly as possible with up-to-date storage and handling devices to take care of the immense grain and other shipments that in a very few years would be seeking an outlet from this vast country to consumers in other lands. Mr. Ballantyne regretted that he would be unable to retain his position as a commissioner after the close of navigation in the fall of 1912. In conclusion he said that after wide observation he was convinced that there were no more capable and up-to-date builders in Canada than those of Montreal.

Government Aid in Technical Education

"Building up Intelligent Co-operation" afforded Mr. W. T. Castle a subject for a brief, but interesting, address. He advocated Government aid for technical schools in connection with the building trade. In Europe in addition to this they had museums in which might be seen and studied examples of architecture and construction. He thought this would be a good thing for the Canadian Government to copy and this might be followed up with legislation to prevent slums and congested conditions.

The Hon. Rodolphe Lemieux, in responding to this toast, referred to the Lemieux Law and its effectiveness in bringing about a settlement of labor disputes. It had been successful he claimed in 99 per cent. of the cases in which it had been applied. He would like to see the principe underlying this law applied by the builders' exchanges in all parts of the country. The principle was one enunciated by Lincoln in his famous saying, "If there is to be a quarrel, let us settle it first and discuss the merits afterwards."

"Building up Sound Public Opinion" was the title of the toast to "The Press" proposed by Mr. John Quinlan, a director of the Builders' Exchange, and responded to by the representative of the "Contract Record." This was followed by the toast to "Our Guests," proposed by Mr. Thomas Gilday and responded to by representatives of the Quebec Association of Architects, the Montreal Board of Trade, the Montreal Chambre de Commerce and the Canadian Manufacturers' Association. The opinion was expressed that this was the most successful banquet ever given by the Builders' Exchange, having regard to the interest in the proceedings, the excellence of the addresses and the large attendance.

Protest from Canadian Stone Trade

In an interview with a representative of the Contract Record, Mr. James Ballantyne, chairman of the Montreal Builders' Exchange, elaborated his views on the subject of the importation of American stone. He pointed out that the duty on flagstone, granite, rough sandstone and all building stone not hammered, sawn or chiselled (natural stone) was 15 per cent. ad valorem. The low duty handicapped the development of Canadian quarries, but they did not object to the importation of the rough stone until they had sufficient time to develop their own Canadian quarries. What they did protest against was the duty on the sawn or dressed stone, which was only 20 per cent. ad valorem. In Canada there were many contractors who had invested a large amount of capital in equipping their quarries with the latest type of machines for sawing stone, and these firms were prepared not only to supply their own wants, but those of other contractors; owing, however, to the low duties on dressed stone they could not compete with American stone firms, who for many years past had developed a practically unlimited field to a high state of production. It was true that on what was known as "manufactures of stone," such as mouldings, cornices, etc., there was a duty of thirty per cent. ad valorem. The Builders' Exchange was pressing for the same duty on sawn stone, which, as a matter of fact, was "manufactured" in the practical sense of the word, it being dressed and prepared to specified dimensions, ready to go up on the building. What they were really aiming at was to equalize the Canadian duty on such sawn and dressed stone with the American duty on similar Canadian stone, which was at the rate of fifty per cent. ad valorem. Mr. Ballantyne did not see why Canadians should admit American manufactures of stone at a smaller duty than the Canadian article was charged by the American Government.

If proper protection were afforded to the industry, it would encourage the investment of still larger sums in quarries. Many of the big contractors owned quarries, but it did not pay to use the stone out of these as they could import it cheaper. Many of the large buildings lent themselves to the extensive use of stone, which was now imported ready to use. Mr. Ballantyne referred to the experience of Mr. John Quinlan, of Montreal, in the West. Mr. Quinlan purchased a large quarry at Glenbow, near Calgary, and started to quarry and manufacture stone for the Government building at Edmonton. Before he finished, however, he found he could buy Indiana limestone and put it into the building at a cheaper rate than he could quarry it, and as a matter of fact American stone was used in a portion of the structure. The same fact applied to the new C. P. R. hotel to be erected in Calgary and it also affected the construction of the new C. P. R. station last year in Regina. The protection of Canadian quarries would mean the employment of a large number of Canadians, not only in cutting out the rough stone, but in finishing it. Under the present conditions there was no incentive to put money into such a business.

The railway freights were also against the Canadian industry. The rates were made by American roads, that on rough stone being 54 cents a cubic foot, while on machine stone it was 48 cents, a discrimination of 6 cents in favor of the manufactured article.

Manufacturers had had protection for many years, and the contractors were equally entitled to it. The Builders' Exchange intended to take up this matter with the Ottawa Government as soon as the latter had fairly settled down to work.

United States Sub-Contractors

The president of the Exchange also referred to the question of United States' firms who came to Canada and obtained big contracts and gave most of the sub-contracts to their fellow-countrymen. These men, he said, bought only such material as they were bound to and employed the smallest possible number of local men; these outside contractors as a rule paid no taxes and had no permanent interest in the country; they took the money out of Canada and deprived local men of work and local supply houses of business. The United States general contractors operated under Canadian charters, but the sub-contractors were under no such obligation. This competition was felt more keenly in the West than in the East, and he regarded it as unfair. The Builders' Exchange also intended to take action on this question. A duty of ten per cent. on the amount of all subcontracts carried out by United States' firms who did not take out Canadian charters would be a good way of checking this form of competition.

One of the latest Winnipeg concerns to secure a charter is "Winnipeg Builders, Limited," which has a capital stock of $100,000. The incorporators are Mr. P. Callaghan, builder and contractor (28 Leslie street, Elmwood, Winnipeg), his wife, Mrs. Callaghan, and Mr. Manuel Gonsalves, of British Guiana. The company will carry on building operations of all kinds but during the present year they will concentrate mainly upon artisans' dwellings, costing from $1,300 to $3,000. The firm anticipate a good business in this class of house and state that Winnipeg is somewhat overstocked with large residences. Mr. Callaghan has already built quite a number of small houses in Winnipeg and has been very successful with them. This year Winnipeg Builders, Limited, will put up something like fifty or sixty of these dwellings.

Millions to be Expended on Highways of Quebec

At the opening of the Quebec Legislature it was stated that the Colonization Department had commenced the construction of a main artery in the Temiscaming region, and proposes to begin opening a road about one hundred and ten miles long in Abitibi next spring, along which road free grants of lots will be given. The Government intend urging the construction of new railways through the north of the province. The act passed last year in connection with rural roads was producing good results. The government was nevertheless of opinion that the campaign it inaugurated for improving of means of communication would be given a further impetus if the government were to aid municipalities which borrow money to make their summer roads better. It will, therefore, ask members to place a considerable appropriation at its disposal to enable it to provide a sinking fund for the loans contracted by municipalities and to contribute to the payment of interest on the same. The Government sanitary service will be re-organized next summer. To that end the province will be divided into several inspection districts, with a hygienist in charge of each.

Sir Lomer Gouin, elaborating the subject, asked for a loan of $10,000,000 for improving the highways of the province. He announced that the Government would guarantee half the interest and pay the sinking fund, the municipalities paying the other half of the interest. They proposed to have the best system of roads that had been constructed since Confederation. The Government scheme for facilitating communication in the northern part of Quebec provided for the construction of a line of railway from Montreal to James Bay at the mouth of the Nottaway River, and also, as a connecting link, of a new route, partly water and partly rail, to Port Nelson, and from thence to Saskatoon. The purpose was to tap the new wheat district, from which Quebec was sure to derive great benefit, and more benefit would accrue from the mineral deposits to the North. Premier Gouin also stated that the projected railway would in reality open up the Ungava district in the far North. The extension from Kippewa to Villemarie would soon be built by the C. P. R. In connection with this announcement of a line to James Bay a petition was presented by a party of English and Canadian capitalists to construct the line. The petitioners were: Abraham M. Laredeo, financial agent, London, Eng.; H. S. Ross, K.C., Montreal; P. O'Reilly, broker, Ottawa; E. S. Daniel, solicitor, and Mordecai de Abraham Laredeo, financial agent, London, Eng. The petition was to construct the Ottawa, Abitibi & Hudson Bay Railway, to run from near Hull northwards through Wright County and Pontiac County to a point near Grand Lake, Victoria, thence to a point on the Transcontinental near Lake Metagomi, and northwest to a point near James Bay. Sir Lomer Gouin, in the course of a discussion, said the Federal Government should take up the scheme he outlined, but in the last resort the Quebec Government would undertake the responsibility.

Water Powers of Canada

The first inventory ever taken of the water-powers of Canada has been completed by the Commission of Conservation and the results embodied in a large and profusely illustrated report just issued. The investigation made by the Commission, which has extended over a period of two years, shows that there are 1,016,521 horse-power developed from water-power in Canada. Every phase of the subject from the laws governing the disposition of water-powers in the various provinces, to the actual physical date regarding each individual water-power concerning which information was obtainable, is treated in the report. In addition, there is a very full bibliography of 30 pages, and appendices giving, among other things, the text of the laws concerning the export of power and also of the treaty recently concluded with the United States regarding the establishment of an International Joint Commission.

General Information on Water Powers

The volume opens with two chapters of an introductory nature that are concerned mainly with the general economic bearing of water-powers on national development. The relation of water to agriculture, mining, navigation, domestic supply and so forth, is dealt with, and the principles to be used in the interpretation of water-powers data are stated and discussed critically. The broad and optimistic statements very often made on the platform and in the press regarding our vast water-power resources are deprecated. To quote from the Report, "General statements implying that the aggregate amount of water-power must be great because the total water area, or watershed area is so great, or because there are so many lakes and rivers, are generalities to be considered of very little definite value. . . . . One of the chief dangers of such generalities is to create in the popular mind a feeling of unwarranted assurance that, even though desirable water-rights are being granted by the government, yet there is so much left, that no apprehension may be entertained regarding the amount of power rights being parted with."

Valuable Statistics for Each Province

A chapter is devoted to the water powers of each province in which the general features of the province as regards water-power development are discussed and an outline given of the law whereby powers are granted or leased to private individuals or corporations. The larger developments are also described. The statistical data given in tabular form includes the height of the fall, the horse-power that may be developed, the present development and the main uses to which the power is applied such as lighting, pulp and paper making, etc. Reference is also made to the possibility of increasing the amount of power developed by storage reservoirs and dams where such are feasible.

Less Power Available at Niagara Than Expected

The power situation in Ontario is treated very fully, special attention being given to the power possibilities at Niagara and the conditions affecting development there. Each of the power companies operating there, whether on the Canadian or American side, is described in detail. A significant reference is made to the granting of franchises to develop power at Niagara Falls. The Report states that the low-water flow of the Niagara River would yield at the Falls, about 2,250,000 h.p., of which Canada's share (one-half), would be 1,125,000 h.p. "Franchises have already been granted," it goes on to say, "and plants partially completed, for the development on the Canadian side of the river, of about 450,000 h.p. In other words, instead of 'millions' of horse-power being available, as has been sometimes stated, it appears that about half, and by all odds the better half, of Canada's usable share of Niagara Falls power has already been placed under private control."

Special Report on Western Powers

The volume embodies all the useful information regarding the water-powers of Canada that has heretofore been collected and this has been supplemented and, in many cases, verified, by field surveys, conducted by the engineers of the Commission. In fact, all the information regarding the Maritime Provinces powers was obtained in this way last year by the experts of the Commission. The data regarding the Western Provinces was found to be so incomplete that it was decided to make special investigations of the powers in those provinces, the result of which will be published next year in the form of a report on the "Water-Powers of Western Canada." The engineers of the Commission are now engaged upon this work.

Municipal Contracting at Vancouver

During 1911 Messrs. M. P. Cotton Company, Limited, Vancouver, carried out work aggregating in value approximately $900,000. The firm's attention is devoted almost exclusively to municipal contracting. The construction is under the superintendence of Mr. William Ellis. In the above work about 800 men were employed, in addition to a full line of contractors' equipment, including concrete plant, steam shovel, pile driver, logging engines, bunkers, etc. We reproduce herewith a photo of Mr. M. P. Cotton, who has had a long and varied connection with the engineering and building field. Mr. Cotton is a native of Kingston, Ont., but has been in the west for a number of years. The firm's office is located at 119 Hastings street, Vancouver.

Mr. M. P. Cotton, Vancouver, B. C.

Work approximating one million dollars was carried out during 1911 by the Norton-Griffiths Steel Construction Company, Limited, of Vancouver, B. C. Their principal contracts include the Burns Building, Vancouver, the Crane Building, Vancouver, the King Edward High School, Vancouver, the Union Bank, Victoria, and the Burns Building at Calgary. The uncertainty of labor was the chief adverse influence encountered. The firm believe that 1912 will be a good year, but they do not look for a record-breaker owing to the high price of labor and the pessimistic attitude of the financial men.

The Builders' Exchange of Regina, Sask.

The Brief History and the Personnel of this Thriving Western Organization—Its Rapid Development and Good Prospects

ONE of the youngest and at the same time most energetic organizations of its kind in the country is the Regina Builders' Exchange which, although formed only a little more than a year and a half ago, is already taking its place among the best of western Canada. Everybody knows that Regina, the capital city of the Province of Saskatchewan, has been making great strides in recent years, but everybody is not infused with the same optimism and enthusiasm which resulted in the formation of the Regina Exchange a year ago last May. At that time it dawned upon some of the most progressive members of the contracting community in Regina that such a city as theirs, with its phenomenal and ever-increasing growth, should have some organization which would take over the responsibility of local and provincial questions affecting the general interests of the building trade. They realized that what had been accomplished by means of organization in other cities might be effected in Regina; that the social and other advantages of membership in a good live association, might be theirs also. At the inaugural meeting a strong directorate was appointed with Mr. R. J. Lecky, then superintendent for Messrs. Peter Lyall & Sons, as President. At that time nineteen signified their intention of becoming members. Later in the year a strong impetus was given the Exchange by a visit of Messrs. E. T. Nesbitt and J. H. Lauer, respectively President and Secretary of the Canadian National Association of Builders.

Upon his return to the east from this historic western trip, which did so much to improve the status of the national association and which resulted in the affiliation of practically all the western builders' exchanges, Mr. Nesbitt gave a number of addresses before the Toronto and other exchanges and, if we remember rightly, made special reference to the enthusiastic reception which he received at Regina. At any rate, rightly or wrongly, the city enjoys an unexcelled reputation for hospitality and for its zealous support of the national federation of contracting interests. We would not have disgressed so far if we had had more to relate concerning the history of this Exchange, but the association is a young one and its achievements few.

At the first annual meeting, Mr. W. A. Wilson, of Messrs. Wilson & Wilson, succeeded Mr. Lecky as president. The membership is now about fifty. The secretarial work of the Exchange was taken over at the outset by Mr. H. S. Abbott, but a permanent secretary in the person of Mr. George Powell, has now been appointed.

So far the most cordial relations have existed between the Regina Exchange and the various trades. Any small disputes that have arisen have been readily adjusted by a meeting between the parties concerned, this being attributable in no small measure to the good offices and influence of the master builders' association.

We have alluded above to the growth of Regina. The nature of its growth may be gauged from the building statistics for the last three years which are as follows: 1909, $749,479; 1910, $2,351,288; 1911, $5,099,340. These figures represent only the actual building permits for the city and do not include the legislative buildings or any civic improvements. The Building Inspector at Regina, Mr. O. T. Falls, informed us in a recent communication that 1911 was in every respect the greatest year Regina had ever had and that with trade and labor conditions as satisfactory as they were then, the prospects were never brighter for the coming season. And the progress of Regina is naturally a fair barometer of the prosperity of the Regina Builders' Exchange.

The present directorate of the Exchange is composed of the following gentlemen: President, Mr. W. A. Wilson, of the general contracting firm of Messrs. Wilson & Wilson, Regina; Vice-president, Mr. D. J. McKay, of the McKay Construction Company, Limited, Regina; Secretary, Mr. George Powell; Treasurer, Mr. R. H. Read, Managing Director Regina Plumbing & Heating Company, Limited. Directors: Mr. J. M. Taylor, of the North Western Electric Company, Regina; Mr. R. J. Lecky, Assoc. Mem. C. S. C. E. (President 1910), general contractor; Mr. George Minkley, contractor; Mr. H. J. Potts, of Messrs. Potts & Smith, plumbers and steam fitters, Regina.

This association is a fine, healthy child which, upon attaining manhood, should wield a powerful influence in Western Canada.

B. and C. Association of Essex

A joint meeting of the builders of London and Woodstock was held at ths Oxford Hotel, Woodstock, recently, with the object of organizing a builders' exchange in the latter city. Messrs. E. R. Dennis, George Gould and A. R. Wright, of the London Builders' Exchange, gave addresses and there is every reason to expect that the desired consummation will be effected. Among those present were: Messrs. C. F. Peilfer, L. A. Boss, Scott Murray, John Jones, W. Nutkins, George Gould, L. H. Martyn, E. R. Wright, E. R. Dennis and Wm. Tytler, of the London Builders' Exchange. The following local building contractors were present: Messrs. T. D. Broom, G. W. Adams, D. C. Whitehead, John Griffin, A. J. McKinney, George Murray, J. D. Tindale, Wm. Bond, H. Johnston and W. J. Taylor.

Exchange Proposed for Woodstock, Ont.

The annual meeting of the Builders and Contractors' Association of Essex was held at Windsor, Ont., on January 9th. Officers for 1912 were elected as follows: President, Mr. T. W. Brooke; Vice-president, Mr. James Penington; Secretary-treasurer, Mr. Robert Parker; Recording Secretary (for the fifth consecutive term) Mr. G. W. Freeman. The executive board of seven was made up by the election of Messrs. Elmer Giguac, Charles Scott and L. B. West. The city of Windsor, Ont., had a good year in 1911 and a continuation of the building boom during 1912 is anticipated. Of the most recent developments we note that the Government has just taken tenders for a reinforced concrete dock 580 ft. in length along the river front. The Masonic Lodges have important building plans in the course of preparation and a number of substantial business blocks and residences are contemplated.

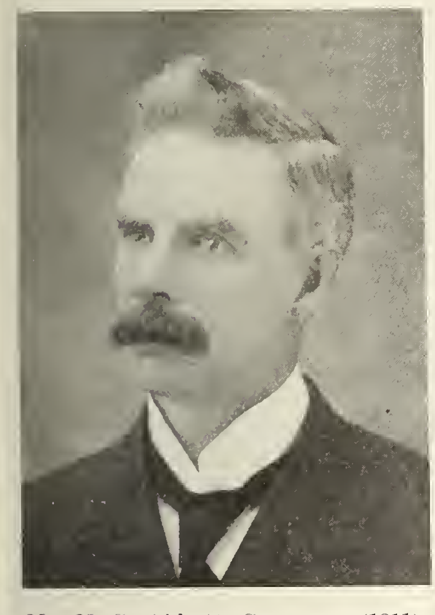
Messrs. Heenan & Froude, of Manchester, England, have been awarded a silver medal by the Royal Sanitary Institute for their "Trough Grate for Refuse Destructors." Before deciding the award, the Royal Sanitary Institute sent two experienced judges to Hertford to see the grate and clinkering apparatus in operation.

Mr. W. A. Wilson, President

Mr. D. J. McKay, Vice-President

Mr. R. J. Lecky, Past President and Director

The President, Vice-President and Directors of the Regina Builders' Exchange



Mr. H. S. Abbott, Secretary (1911)

Mr. R. H. Read, Treasurer

Mr. George Minkley, Director

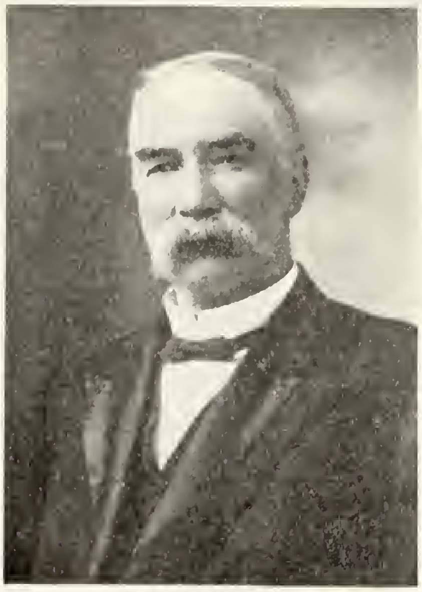
Mr. H. J. Potts, Director

Mr. J. M. Taylor, Director

Great Things for Nova Scotia

One of the busiest contracting firms of the Maritime Provinces is that of Messrs. Falconer & McDonald, of Halifax, N. S., who carried out work in 1911 representing a value of something like a quarter of a million dollars. At present they have in hand a number of important contracts, including a post office and customs house at Parrsboro, N.S.; breakwater at Brooklyn, N.S.; engine and power house at Stellarton, N.S., and freight shed at No. 9 pier, Halifax. All of this work is under the direct supervision of the firm. It is the practice of Messrs. Falconer & McDonald, upon securing a contract, to assemble the required material on the site of operations. They find that in so doing they obtain better results than by bringing in the material in small quantities.

One of the difficulties they report is the securing of competent construction foremen. A man in this position who can read plans, handle workmen and work harmoniously with the architect and the owner is a very scarce commodity in this section of the country, and also, it might be added, all over Canada. In a recent communication to the Contract Record and Engineering Review, Messrs. Falconer & McDonald emphasize the opportunity that Canada affords for good, efficient foremen who can assume the responsibility of large construction work. Apart from the increase consequent upon the higher wages that have come into effect in recent years, Messrs. Falconer & McDonald report an ever-increasing rate for skilled workmen. They attribute this to the decline of the apprenticeship system and also to the fact that so many mechanics have been lured from the east to the west.



Mr. A. D. Falconer, of Halifax.

Nova Scotia Technical College, Halifax, N. S.

The firm entertain the most optimistic ideas in regard to 1912. The following is an extract from their letter: "Never before have prospects looked brighter. Fruit growers are jubilant over an increase in the production of fruit; farmers are awakening to the fact that with proper cultivation our soil can yield as good returns as any in Canada, and capitalists realize that here in Nova Scotia, with our natural resources, coupled with an excellent climate, they are assured of good returns from proper investments. We expect great things for Nova Scotia."

We have pleasure in introducing our readers to Mr. A. D. Falconer, senior member of Messrs. Falconer & McDonald, and we also show a view of the Nova Scotia Technical College, one of the firm's recent contracts.

Personal Mention

Mr. Hugh Jackson, treasurer of The Positive Clutch & Pulley Co., has resigned his position to accept the cashiership of The Canadian Fairbanks-Morse Company, Limited, at Calgary.

Mr. F. L. Fellowes, city engineer of Vancouver and late city engineer of Westmount, has been on a visit to Montreal. On his way he visited a number of American cities for professional purposes.

Mr. Henry Sonette, whose name is well known among the railway contractors of the Maritime Provinces, died suddenly at Bridgewater, N. S., on January 8th. The late Mr. Sonette was a native of Quebec. His last contract was on the N. T. R., near Edmunston, N. B.

Mr. C. H. Walker, who was formerly connected with Messrs. Hooper & Walker, of Winnipeg, is taking complete charge of the building department of Messrs. William Dunford & Sons, builders and contractors, Victoria, B. C. Mr. Walker's experience in the building trade extends over a period of twenty-five years.

Mr. J. M. Lyall of Toronto was the successful contestant in the competition for plans for the Toronto Stock Exchange building on Bay street, Toronto. A prize of $400 attaches to the first place in the competition. The proposed building will be of brick and terra cotta construction and will cost approximately $75,000.

Mr. Noble, who was employed by the Canadian Fairbanks-Morse Company, Limited, previous to his entering the organization of the Positive Clutch & Pulley Company, Toronto, last June, has accepted a position under Mr. Patton, and now has charge of the Transmission department of The Canadian Fairbanks-Morse Company, Limited, at Toronto. He is widely known throughout his territory as being well posted on all transmission lines.

At Toronto last week, the death occurred of Mr. James Isaac, one of the best known cut stone contractors in the local building trade. He had been ill for two weeks, suffering from bronchitis and asthma. The late Mr. Isaac had been a resident of North Toronto for forty years, and for the past twenty-eight years was actively engaged in the contracting business, and a member of the Builders' Exchange. He was born in Kingstown, Wiltshire, England, 70 years ago.

Mr. L. W. Rundlett, who has been appointed Engineering Commissioner at Moose Jaw, at a salary of $6,000 a year, has been in the employ of the city of St. Paul, Minn., for the past quarter of a century and has assisted in the upbuilding of that city from a small place of 20,000 inhabitants to one of the most important cities in the centre of the United States, having now a population of about 220,000. When Mr. Rundlett took up duties he was appointed as engineer, but for the past ten or twelve years he has officiated as commissioner.

Dr. J. W. S. McCullough, Provincial Health Officer, has returned to Ottawa from a two weeks' tour of the United States, where, with City Engineer Ker, he inspected and secured data upon filtration plants in the principal cities. Dr. McCullough and Mr. Ker made the trip in connection with the Ottawa Water Commission's inquiry into the question of providing the capital with a pure water supply. Their investigations covered the cities of Washington, Philadelphia, Columbus, Cincinnati, Louisville and New Orleans.

No appointment has yet been made to the vacant post of City Engineer of Calgary. The present incumbent of the office, Mr. J. T. Child, is leaving Calgary for reasons of health, he and his family having found the high altitude particularly trying. Mr. Child has resided in Western Canada for twenty-four years. He has been in the employ of the government, the C.P.R. Irrigation Company and the city of Calgary. In the 80's he located the Indian Head water supply and also a similar supply for Regina. In the 90's he went to the Irrigation Company and had the supervision of the main portion of the ditching operations of that concern. He also supervised the installation of Calgary's vater system in 1907, and in the following year was appointed engineer of that city.

City Engineer Child, of Calgary, who is resigning.

Mr. G. H. Massey, a director and chief manager of the eid-Newfoundland Company, died suddenly at his residence in Westmount, Montreal, on January 11th. He had been ill for some time, death being due to heart failure. Mr. Massey was born in County Dublin, Ireland, and came o Canada in 1871. For a period of fourteen years he was onnected with the Reid-Newfoundland Company. Later e was engineer-in-charge of the Chaudiere Bridge, Ottawa, he C. P. R. Bridge, at Lachine, and the Sault Ste. Marie ridge. He is survived by his widow and eight children.

Mr. F. D. Swan, the English engineer who was engaged y the Dominion Government to prepare a plan for harbor nprovements at Vancouver, B.C., has practically concluded he preliminary work and is leaving for Europe. He exects to return to Canada next March when his report will e ready for presentation to the federal authorities. During his stay abroad he will visit Russia, he having been ngaged to report on a number of important enterprises n that country.

Construction News and Notes

The Dominion Government are stated to be planning the erection of a $600,000 customs house in Toronto.

During 1911 the building permits issued by Maisonneuve, a suburb of Montreal, totalled $2,260,160, an increase of about $500,000.

The Ontario Lime Company, Toronto, at the head of which are Messrs. J. A. McAndrew and W. H. Irving, of Toronto, will carry on a general land and building business. The company is capitalized at $500,000.

The Canadian Supply Company, 220 King street west, who handle Casco weatherproof products, favored us with an artistic calendar for 1912.

Messrs. G. A. Campbell, G. L. Alexander and H. Lajeunesse, of Montreal, have incorporated the Argenteuil Granite Company, Limited, with a capital of $250,000.

The building permits issued at Edmonton, Alta., in 1911, amounted to $3,672,260 compared with $2,159,106 in 1910. The number of permits issued was 1757, as against 1053.

The Montreal Council has appointed four new sanitary inspectors. Two of them are first class linguists, one speaking seven languages. The two men will work in the foreign districts.

The Portland Cement Contracting Company has begun operations for the erection of a plant at Todd Inlet, Vancouver Island. This is within a few miles of the Vancouver Island Portland Cement Company's plant.

Among the powers sought by the Montreal Council at the Quebec Legislature is the right to establish and operate one or more underground tramway lines, to be operated by electricity or other motive power.

The Algoma Steel Bridge Company of Canada, Limited, Winnipeg, Man., have obtained a charter with a capital of $40,000. The incorporators are Messrs. A. Bayne, M. McCallum and M. B. Stone, all of Minneapolis.

The Alabama Traction, Light & Power Company, Limited, Montreal, incorporated recently by Messrs. G. W. McDougall, K.C., L. Macfarlane, R. E. Moyse and R. W. Plimsoll, of Montreal, has a capital of $30,000,000.

The Westmoreland Company, Limited, Montreal, recently incorporated with a capital of $200,000, will carry on a land and building business. The incorporators are Messrs. J. Fortier, L. Goulet and E. N. Hebert, all of Montreal.

The Keystone Portland Cement Company, Limited, has been organized with a capital of $600,000. The headquarters of the new concern will be at Frank, Alta., where an up-to-date plant with a capacity of 1,000 barrels a day will shortly be erected.

The administration of the good roads programme, which the Federal Government proposes to inaugurate, will be in charge of Hon. Frank Cochrane, Minister of Public Works. Mr. A. W. Campbell, his deputy, will be the head of the department.

Mussens Limited, dealers in railway contractors, mining and municipal machinery and supplies, have sent us a good, plain office calendar for 1912. Some of the principal lines handled by the company are displayed on the various sheets of the calendar.

Mr. J. S. Irvin, of Ottawa, reports excellent progress on the plant of the International Portland Cement Company at Spokane, Wash. Mr. Irvin is very enthusiastic as to the prospects of the new company, particularly in view of the high prices paid for cement in Western Canada.

Mr. E. A. James, Toronto, Highway Engineer for York County, has located at Havelock, Ont., a quarry of trap rock which, it is stated, can be placed f.o.b. any siding in York County at less than $1.90 a ton. Mr. James states that in all probability this rock will be used largely in macadam construction in this section of Ontario from now on.

The City of Guelph, Ont., is entering upon its second growth. The prospects for the present year are particularly bright and it is probable that the building for the year will approximate three quarters of a million dollars in value. There is already in sight, part of which is now under construction, over three hundred thousand dollars' worth of building.

At a meeting of the Montreal council an effort was made to authorize the construction of sewers costing $47,000 by day labor. One of the controllers successfully opposed this, on the ground that the city had no right to charge the people who were paying for these sewers more than they would cost by private contract. The chief engineer of the city will tender in the usual manner.

A bridge to cost about $300,000 will soon be built by the provincial government across the St. John River at St. John, to replace the present suspension bridge, which must soon be abandoned. The style of the bridge has not yet been determined, but it will be built for foot passengers, street car and team traffic. Mr. Schneider, consulting engineer of the Quebec Bridge, will submit plans as to the style of the new structure.

A cement merger has been formed in England under the firm name of the British Portland Cement Manufacturers, Limited. The capital of the new concern is $17,500,000. It will have a working agreement with the Associated Cement Company. Lord St. Davids is chairman of both companies, and the combined capital of the two concerns will amount to about $60,000,000. The two companies will control five-sixths of the cement production of the country.

A new Quebec concern is the Mechanics' Supply Company, Limited, who will deal in engineers' contractors and plumbers' supplies. The incorporators are Messrs. W. H. Wiggs, G. H. Simpson and W. R. Wilkinson, all of the city of Quebec. The concern is capitalized at $300,000. Another recently formed Quebec company is the Quebec Engineering & Construction Company, Limited, incorporated with a capital of $20,000, by Messrs. J. H. Dillon and T. A. Mercier, of Montreal.

Mr. R. S. Lea, consulting engineer to the city of Vancouver, has submitted an interim report on the Greater Vancouver sewerage scheme. In his report Mr. Lea states that the area in the sewerage district is 100 miles square compared with 22 square miles for the city of Manchester, England, 94 square miles for Birmingham, 20 miles for Berlin, and 190 miles for Boston, and the cities and towns surrounding. Mr. Lea urges the immediate construction of three trunk sewers and recommends the appointment of a resident assistant engineer. The report was adopted.

The Standard Cement Company, Limited, Quebec, Que., have obtained a charter with a capital of $400,000. They have secured an extensive property at Chambord comprising something like 300 acres, and expect to manufacture a superior quality of cement which will compare favorably with the best on the continent. Excellent reports have been made by Charles R. Hazen, of the Milton Hersey Company, Limited, whose president is Dr. Milton L. Hersey, Provincial Analyst for Quebec, and also City Analyst for Montreal. Professor M. L. Sohier, of Montreal, has also reported favorably upon the prospects for manufacturing a good quality of cement. The company's property is situated at Chambord on the Canadian Northern Railway. The company will have an extensive scope in the Province of Quebec and should find a good field for a profitable business.

Winter Work at Saskatoon

According to information to hand from Saskatoon, Sask., the Lock Joint Pipe Company of New York are busy turning out concrete pipe with the thermometer at thirty below zero. The work is done outside. Hot water is used in mixing the ingredients and the gravel is also heated before it is put into the mixer. The cement pipes are cast in iron molds and these are connected up to the boiler and steam circulated through the moulds while the pipes are hardening. This does not permit them to freeze and the material turned out is fully as good as that which is made in the warm weather.

One feature of the undertaking is that it entails little extra cost. There is only the heating of the water and of the gravel. Even during the summer steam was circulated through the moulds while the concrete was hardening, in order that the pipes would be removed more quickly; so that there is no additional expense in this respect.

The Lock Joint Company are making these pipes for the storm water sewers which are being placed throughout the city.

Proposed Standard Brick

Winnipeg, January 5th, 1912.

Editor Contract Record:

To obtain the desired results we feel that it would be best to place the matter before conventions of brick manufacturers so that the general view of the trade may be ascertained. Doubtless considerable benefit would be derived from the standardization of common brick. This could hardly be done in the case of face brick seeing that the special shapes of certain classes of face brick add largely to their effectiveness in the finished wall.

We trust that the efforts you are making in connection with common brick will be successful.

Yours very truly,
WAITE-FULLERTON COMPANY, LIMITED.

Haney, B.C., January 6, 1912.

Editor Contract Record:

We fully agree with you that something should be done in the matter of standardization to arouse the brickmakers of this country. We shall be pleased to have the views of others and to co-operate in any movement towards the desired end.

Yours truly,
PORT HANEY BRICK COMPANY, LTD.,
H. Burnet

The "Fenestra" Solid Steel Window

The general tendency of engineers and architects to use steel in place of wood wherever practicable in building construction, is plainly indicated in the favor found by the solid steel window for industrial construction and the metal casement for office and bank buildings, public building and similar high class construction.

Of this type of solid steel window for factories, the "Fenestra," manufactured by the Steel & Radiation, Limited, of Toronto, is a well known make. "Fenestra" is the name given by the German patentees to the peculiar intersecting joint that characterizes this window.

We are told that nearly five million square feet of "Fenestra" have been used in the United States in the past three years. The use of this construction in Canada has not been so widespread, but Steel & Radiation Limited, are now organizing to place this product before engineers and architects in a thorough way and to this end have secured the services of Messrs. Hade, Davock & Beltaire, identified with this industry in the States from its introduction there and regarded as experts in their line.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Belleville, Ont.

Plans are being prepared for sewerage to cost $10,000. Specifications at office of city engineer, Jas. Gray Lindsay.

Specifications are in progress for pavements to cost $30,000. Plans, etc., when prepared, may be seen at city engineer's office.

Bridgeburg, Ont.

The Railway Commission have approved of plans for viaduct over the G. T. and M. C. R. tracks. Cost $20,000. Engineer, F. J. Anderson, Niagara Falls; reeve, J. Atwood.

Calgary, Alta.

City Engineer Child will recommend to Commissioners the installation of filtration plant. Estimated cost of a similar one placed at $110,000. Before work is undertaken matter must go before council and before ratepayers.

Carleton Place, Ont.

By-law carried to borrow $150,000 for waterworks and sewers. Commission appointed: Mayor Smythe, Wm. Findlay, Wm. Baird, A. E. Crain and G. Fulton. Work to be proceeded with as soon as possible.

Galt, Ont.

Tenders will be called for waterworks, 250 k.v.a., 2,200 volts motor, direct connected to centrifugal pump. Specifications prepared by Hydro-electric Commission, Toronto.

Grandview, Man.

Tenders are called for road machinery. Secretary-treasurer, Wm. Dickie. Six wheel scrapers, size 2½. Received by sec.-treas. until Feb. 1st.

Kamloops, B. C.

Debenture by-law will be submitted for improvement of waterworks system. J. J. Carment, city clerk. Citizens petitioned council to raise $60,000 to be expended on this work. Vote taken on January 11, 1912.

London, Ont.

City of London Water Commissioners plan new waterworks repair shop to cost $10,000. Official in charge, Supt. Glaubitz. Brick construction and fully equipped with machinery for making repairs. Work to commence in the spring.

London, Ont.

It is proposed to extend city water mains to London Asylum, a distance of 1½ miles, to improve fire fighting facilities. Supt. Glaubitz in charge.

Ottawa, Ont.

The Dominion of Canada Public Works Department plan to construct tar macadam paving around Parliament Buildings at a cost of $18,000.

Mayor Hopewell again recommends the preparation of plans by City Engineer Ker for filtration plant to be afterwards submitted to expert for approval.

Report of engineers on construction of road has been filed with Ottawa Valley Motor League. Cost of grading estimated at about $100,000. A meeting will be called later at which City Engineer Ker will represent the City of Ottawa and C. H. Keefer, the League.

Owen Sound, Ont.

The council will shortly consider the permanent paving of the principal streets. Mayor, E. Lemon.

Toronto, Ont.

The City Engineer's Dept. is figuring on the cost of paving University avenue. Work is to be undertaken early in the spring.

City Engineer recommends the following on initiative and local improvement systems, pavements: asphalt, $25,823; concrete, $6,618; brick block, $10,193; bitulithic, $16,714; asphalt block, $41,803, and concrete walks and curbing.

CONTRACTS AWARDED

Lethbridge, Alta.

Sewage disposal plant. City engineer, A. C. D. Blanchard; consulting engineer, T. Aird Murray, Lumsden Bldg., Toronto. Contractor, Hotson, Leader & Goode, $63,522.

Paving to cost $100,000. City engineer, A. C. D. Blanchard; contractors, Bitulithic Company, Winnipeg; Eloso Paving Co., Vancouver, asphalt, concrete and bitulithic will be used.

Vancouver, B.C.

Pipes and valves (new water main) (Seymour Creek Extension). City clerk, W. McQueen. Supply of pipe, Balfour, Guthrie & Company, 739 Hastings street west, $75,480, delivery in 105 days. Supply of valves, A. J. Forsyth, $8,687. Contract for trenching will probably go to C. E. Pottage, Portland, Ore., $37,650.

Railways, Bridges and Wharves

Fredericton, N. B.

Tenders will be called shortly for new concrete wharf 500 feet in length and dredging of river at waterfront.

Goderich, Ont.

Tenders are called for manufacture and erection of steel bridge over Maitland river on boundary of Hullett and McKillop townships, 3 miles from Seaforth—Pratt truss, 100 ft. clear span, concrete floor or Warren Truss, 90 ft. clear span, concrete floor; width of roadway, 16 ft. Bridge to be completed on or before August 15th. Received by Wm. Lane, Goderich, or D. Patterson, until Jan. 23rd.

Hamilton, Ont.

A company has been formed to move about 309 brick and frame houses on right of way of railroad. A large site has been bought in East Hamilton where most of the houses will be placed and altered. S. N. Richardson, chief purchasing agent of Canadian Northern Ry., Hamilton, is interested.

London, Ont.

By-law carried for London Street Railway bridge between west and South London, see report 4293—Railway Co. also considering the erection of a connecting bridge and to extend railway to form a new belt.

Ottawa, Ont.

Churchill & Athabasca Railway Co. are applying for power to construct a railway from a point at or near Fort Churchill on Hudson's Bay, westerly to easterly portion of Lake Athabasca.

Tenders are called for construction of one or two steel single screw bucket dredgers, steel single screw hopper barge and one set of Compound Steam Engines to develop 450 ind. h.p., all to be delivered at Sorel; furnishing of 50 Steel Rock Digging Buckets, cast steel links and Manganese Bucket Pins. Received by Deputy Minister until noon, Feb. 26th.

St. Catharines, Ont.

The Hamilton, Grimsby & Beamsville Railway, subsidiary to Dominion Power & Transmission Co., E. P. Coleman, traction manager, plan extension of electric railroad to Beamsville. Right of way from Beamsville to St. Catharines being purchased, same to be used for new high power transmission line from De Cew's Falls to Hamilton, distance of about 32 miles—poles, wire, etc., required. Line to be built next spring. Road not likely until next year.

St. John, N.B.

A. B. Gould, president of contracting company states that everything is being arranged for an early start in the spring on the steam railway and that contracts will be let shortly.

Vancouver, B.C.

The property owners on Nanaimo street have agreed to give B. C. Electric Railway a bonus of $55,000 to extend line on Nanaimo street.

Yarmouth, N.S.

Further work is planned on C.P.R. terminal property being arranged by extension of wharf some 200 ft. requiring heavy piles and planking, additional office and warehouse fittings in the enlargement undertaken. In the spring addition of 25 ft. to present wharf and trestle built to carry rails to front of pier to accommodate the larger steamers expected for route between Boston and Yarmouth. Much dredging will be required.

CONTRACTS AWARDED

Lethbridge, Alta.

United States Steel Products Co., 706 McArthur Bldg., Winnipeg, has been awarded contract for street car equipment. City engineer, A. C. D. Blanchard.

Vancouver, B.C.

Wharf to cost $70,000, Carrall street, for Union S. S. Company. Contractor, O'Brien, Caughey & Lumpke, Seattle. Contract did not go, as stated previously, to British North America Construction Company Successful contractors will open branch here and start work within a fortnight or so

Public Buildings, Churches, Schools, etc.

Belleville, Ont

It is reported that the Dominion Government will locate a Battery here necessitating alterations to an old house formerly used as an Armory.

Calgary, Alta.

Plans are prepared for new school, cost $150,000, South Calgary. Building Superintendent of Schools, H. McLelland. Sixteen-room, 200 x 140, fireproof, hollow tile and concrete floors.

The Calgary School Board, Chairman, F. W. Mapson, are planning six new schools. 12-room school in East Calgary; 12-room school in Mt. Pleasant, and an 8 or 12-room in Sunalta, are among the number. Many applications received for college school on outskirts of city.

Canora, Sask

New tenders are called for town hall. Solid brick; plans, etc., may be seen at office of town clerk or at office of architect. Received by town clerk until 6 p.m. Jan. 17th.

Edmonton, Alta.

Option has been taken on 100 x 150 ft. on Elizabeth street, as building site for police station. Money by-law providing necessary funds for city hall will be submitted shortly. Option holds good pending ratification of ratepayers.

Fernie, B.C.

Tenders are called for construction of armory. Department of Public Works, Ottawa. Secretary, R. C. Desrochers. Plans, etc., with Wm. Henderson, Victoria. Received by secretary until Jan. 24th.

Fredericton, N. B.

The City of Fredericton Fire Committee will recommend to Council at next meeting, issuing of $20,000 in bonds to be applied to erection of brick fire station and also the purchase of 500 feet of hose.

Galt, Ont.

Board of Education are contemplating the erection of a new gymnasium in connection with the Collegiate. Chairman of Committee in Charge, Mr. Spiers.

Guelph, Ont.

A site has been secured for Masonic Temple. Chairman Special Committee, J. A. Howitt. Committee authorized to report on building new Temple.

Hamilton, Ont.

Board of Education will shortly instruct A. W. Peene, architect, 2 King street west, to prepare plans for 10-room addition to Victoria avenue school to cost $50,000. Sec., R. Foster, City Hall.

Plans have been prepared for church to cost $50,000 Main street east, for St. Giles Presbyterian Congregation; pastor, Rev. J. B. Paulin, 14 Fairleigh Crescent. Stewart & Witton architects have prepared plans which will be submitted for approval this week. Tenders called as soon as plans are approved.

Contracts will be let at once for club house to cost $10,000, for Hamilton Golf & Country Club. President, F. R. Martin, 2 Hughson street; architect, Stewart McPhie, Bank of Hamilton Bldg., Hamilton.

Architect A. W. Peene, 2 King street west, has been authorized by Board of Control to advertise for tenders at once for new underground public lavatory on King street; cost $18,000. Plans etc., at office of architect.

Kamloops, B.C.

Sketch plans have been prepared for proposed school to cost $50,000. J. Parlett, architect; building to be 2 storeys and basement, which will contain gymnasium, assembly room, library and six class rooms.

London, Ont.

Plans are prepared for erection of church, for Egerton Baptist Congregation; pastor, Rev. Mr. Steves. W. G. Murray, architect, Masonic Temple, London, has prepared plans. Work will likely commence in spring.

The wall of Asylum for Insane left standing after recent fire collapsed, totally wrecking bakeshop and tearing out side of engine house. New detached bakeshop and engine house to be erected, for which complete kitchen equipment will be required. Equipment to care for feeding of 1200 inmates.

Maisonneuve, Que.

Catholic School Commissioners plan to erect a girls' school to cost $80,000. Architect, C. A. Reeves, 58 St. James street. Three-storey and basement, 186 x 70, stone and brick, on steel frame, concrete foundation, hot water heating, electric and gas lighting. Tenders called by architect in February and will close in February.

Medicine Hat, Alta.

Plans are discussed for new church or enlargement of old Knox Presbyterian church. Those interested, W. E. Fleming and others.

Montreal, Que.

Lieut.-Col. J. H. Burland has offered $100,000 towards establishment of new hospital to be built near Montreal for the treatment of incurable consumptives.

A site has been purchased for theatre, cost $300,000, 328-344 Bleury street, for The Quebec Amusement Company. Manager, H. W. Conover, "The Nickel." Architect, Mr. Westover, Philadelphia. Four storeys, 100 x 166, reinforced concrete, terra cotta facings, concrete foundation, hot water heating, electric and gas lighting, gravel roofing, ventilating system, vacuum cleaner, automatic devices for exits, cooling plant, etc.; seating capacity 3,000.

Tenders are invited for moving picture theatre to cost $100,000, Mansfield and St. Catherine, for G. Nicholas, 322 St. Catherine street east. Architect J. Seath Smith, House of Browne, Montreal.

Tenders are open for erection of building for Institution for the Blind, Notre Dame de Grace Ward. P. E. Layton, 550 St. Catherine street west, president. Architect, Hutchison, Wood & Millar, 50 Royal Ins. Bldg., Montreal. 3-storey, 107 x 47, brick, stone foundation. hot water heating, gravel roofing, hardwood interior finish, electric lighting, steam piping, fire extinguishers. Building to include class rooms for music work, shops for trades, etc. Received by architects until Jan. 17th.

Moose Jaw, Sask.

Plans have been chosen for public library, cost $50,000. Successful architects, Messrs. Reid & McAlpine, Moose Jaw. Two storeys, 100 x 31, light colored pressed brick, Bedford stone, first floor and stock rooms fireproof, interior finish oak and fir, modern ventilating system and steam heating.

Nanaimo, B.C.

A by-law to raise $50,000 for new school buildings submitted on January 11th. Alderman Shaw is interested in the work.

Nelson, B.C.

By-law carried voting $15,000 for hospital. This, with other amounts, makes $70,000 available at once for building. Work will be started shortly.

North Vancouver, B. C.

H. Blackadder & Reyburn Jamieson, architects, have been commissioned to prepare plans for boarding and day school (200 boarders and 100 day pupils), 12 classrooms, hot water heating, Sussex and Lonsdale avenue. Building to be ready for occupation by August, 1912. Cost $35,000.

Ottawa, Ont.

Plans are being prepared for addition to school to cost $60,000, Kent street, for Public School Board. Supt. of Buildings, W. B. Garvock; 12 rooms, solid brick, steam heating, electric lighting.

Port Dover, Ont.

By-law passed to raise $22,500 for new 8-roomed school. Plans to be prepared at once. Reeve Vyse is in charge.

Port Hope, Ont.

Tenders are open for erection of a hospital to cost $15,000, for Directors of Port Hope Hospital Trust; secretary, C. Mann. Architect, Curry & Sparling, 90 Yonge street; 3 storey, structural steel, cut stone, tiles, plate glass, galvanized cornice, fire escapes, electric bell. Tenders received in couple of weeks by secretary. Building to be erected in two sections, first to cost $15,000; later addition, $10,000.

Prince Rupert, B. C.

Trades and Labor Council have applied for grant of city land as site for labor temple and lodge rooms. Council will act at once.

Rhineland, Ont.

Tenders will be received by Rev. John Neeb, Pastor, Rhineland, Ont., until Feb. 6, 1912, for erection of church.

Strathcona, Alta.

By-law to borrow $50,000 for construction and equipment of incinerator will be submitted January 22nd. City Engineer, A. J. McLean. Secretary-treasurer, C. E. K. Cox.

Tillsonburg, Ont.

Plans will be prepared for church to cost $10,000, for Methodist Church; pastor, Rev. Mr. Kerr. A new building to replace the one destroyed by fire recently. A new organ will be required.

Toronto, Ont.
Tenders are open for lodge rooms, (smoking and supper rooms) $9,000 on Lansdowne avenue, for Parkdale Assembly Hall, 4 Lansdowne avenue; architect. W. H. Ratcliffe; 2 storeys, brick and stone. concrete foundation. Terrano floors, tar and gravel roofing, lockers, cut stone, plate glass, skylights, hot water heating, 610 ft. rad.

Tenders are open for assembly hall (2 Lansdowne) for Parkdale Assembly. Architect, W. H. Ratcliffe, 2188 Gerrard street; 2 storey, brick, stone and concrete foundation.

Vancouver, B.C.
A site has been selected for new Cathedral for English Church of Canada; Bishop of Diocese, A. U. De Pencier, New Westminster. Property is one-tenth acreage, 20th ave. and Granville street. Lady chapel or chancel to be erected first. It is probable that plans will be left open to competition.

Vancouver Baseball Club, Pres., Robert Brown, are planning to erect a grandstand to seat 10,000 and bleachers for 3,000 will be built, corner Main and Granville streets.

Victoria, B.C.
Excavation will start shortly for theatre to cost $250,000, Blanchard and Broughton streets, for Victoria Opera House Co. Architect, W. D'O. H. Rochfort, 407 Pemberton Blk. Theatre site 90 x 120 ft., whole building 120 x 120, remaining 30 ft. to be 6-sty. apartment house; seating capacity of theatre, 1750. Excavation will probably start in a week.

Windsor, Ont.
Tenders will be called for public school to cost $40,000. Secretary, Alex. Black. Architect, Jacques & Co., Windsor; 2-storey, 85 x 125, brick, stone trimmings, stone foundation, shingle roofing, white ash interior finish, fan system, heating; combined heating and ventilating.

The Masonic Temple Association, Windsor, propose to erect an auditorium to seat 1,200, on land not utilized by Temple. Meeting of Association will be held shortly to consider same.

Winnipeg, Man.
The exhibition site by-law calling for expenditure of $500,000 will probably be submitted to the ratepayers again in March or April.

Residences

Calgary, Alta.
B. Goodwin is contemplating the erection of a terrace on 15tn ave., to cost $15,000.

Tenders are called for apartment block to cost $150,000 (14th avenue and 8th avenue west, Calgary) for Dr. Spankie. Architect, Lang & Major; 3 storeys and basement, 100 x 50, 26 6-room suites and 10 2-room, brick and stone. Received by architects. No date specified for closing.

Dr. Spankie and others are contemplating the erection of an apartment block; 3 storeys and basement, 26 6-room suites and 10 2-room, brick and stone, near 18th street and Centre to cost $100,000. Work will be commenced this summer.

Montreal, Que.
Henry Morgan, 914 Galt avenue, is building a residence to cost $2,500; 2-storey, 26 x 33, stone and brick, concrete foundation, stove heating, electric lighting, gravel roofing.

Outremont, Que.
T. Latourell is contemplating the erection of a brick encased residence to cost $10,000. Will build in spring.

Toronto, Ont.
A permit has been granted for dwelling, cost $5,000, s. s. Marshmount road, for E. Norman, 29 N. Markham street.

Plans are drawn for residence to cost $5,000, 41 Foxbar road, for Robt. Doherty; architect, J. W. Gray, Confederation Life Bldg.; 2½-storey, brick.

Plans are in progress for apartment house, 31-37 Holmwood ave., for W. A. Foster, 12 Grove ave. $22,000, brick, vacuum cleaning, steam heating.

Excavation is done for one detached dwelling, $5,000, Indian road and Keele street, for E. G. Switzer, 139 Springhurst ave. Two storeys, brick.

Tenders are called for apartments, cost $6,000, Centre Island. Frame, four suites in each. Received by architect, G. H. Miller Co., 59 Yonge st., Toronto.

E. G. Switzer, 139 Springhurst, is excavating for pair dwellings, $3,500. Fairview ave. Architect, J. William Wright, 374 Concord ave. Two storeys, brick.

Plans have been drawn for pair of residences, cost $5,000, S. E. cor. Ellesworth and Bracondale, for Moore Bros. Architect, P. H. Finney, 43 Victoria st. Two storeys, brick, semi-detached, electric light.

Permit has been granted for the erection of apartments, cost $12,000, e. s. Gore Vale ave., for Dundas Building Co., 17 Murray street. Two storeys, semi-detached, brick, cut stone, galvanized iron cornice, ornamental iron lights.

Tenders will be received by architect for erection of three pairs of dwellings, cost $13,000, 728 Ossington ave., for R. McCauley, 11 Barton ave. President, J. H. Stanford, Yonge Street Arcade. Semi-detached, two storeys and attic, brick.

Tenders are open for bungalow, cost $3,000, for Dr. T. N. McGill, Lumsden Bldg., Toronto. Architect, C. F. Wagner, 15 Toronto street, Toronto. Seven rooms, frame construction, shingle roofing, hardwood floors, three fireplaces, plumbing.

Plans are prepared for residence to cost $3,500, 435 Gladstone, for J. H. McCombe, 277 Grace street; architect, T. Crouch, 911 Dovercourt road; 2-sty. and attic, brick, detached, stone foundation, cut stone, shingle roof, hot water heating, electric lighting, hardwood floors.

Plans are completed for apartments to cost $3,500, Bellwood Terr., for Fred Price. Architect, Daniel E. Smith, 77 Victoria street; 2½ storey, frame and stucco, slate roofing, electric lighting, plumbing and electric fixtures for 3 5-room suites.

Plans are being prepared for residence, cost $7,000, Walmer Road Heights. Architect, H. Bryan Gilbert, 47 Wellington street east; 2 storeys and attic. brick, slate roofing, hot water heating, electric lighting, mantles. Tenders will be called shortly.

Tenders are open for detached dwelling, cost $5,000, St. Andrews Gardens, for Robt. Doherty, 41 Foxbar road. Architect, J. W. Gray, Confederation Life Bldg. 2½ storeys, brick, stone foundation, slate roof, hot water heating, electric lighting, cut stone, mantles, plate glass, tile, electric bells, stucco, hardwood floors.

Plans are prepared for residence, cost $7,000, Woodlawn ave., for C. A. Griffiths, Woodbine ave. Architect, J. A. Harvey, Manning Chambers. Two and one-half storeys, brick construction, cut stone trimmings, shingle roofing, hardwood interior finish, hot water heating, electric bells and fixtures, six mantles and tile work.

Plans are drawn for residence, cost $5,000, St. Andrews Garden South, for H. W. Baldwin, 35 Whitney ave. Architect, George Briggs, 47 Lowther ave. Heating, Taylor Forbes Sovereign, 18 rads., 712 ft. radiation, 2½-storey, brick and stucco, beamed ceiling, shingle roofing, stone foundation. Keenes cement, Roman stone, brick mantles, wrought iron anchors.

Tenders are open for four pair of apartments and stores, cost $40,000, cor. Gladstone and Dundas, for J. Baker, 57 Chestnut. Architect, L. S. Yolles, 244 Simcoe street, three storeys, structural steel, cut stone, mantles, fireproof doors, steam heating, electric lighting, plate glass, cornice, galvanized iron, vacuum cleaner, stucco, hardwood, mahogany and burlap trimming.

Vancouver, B. C.
Plans are completed for apartment building, cost $248,000, Pender, Thurlow and Seaton streets. Architects, Horton & Phipps, Pacific Building, Vancouver. Seven storeys, 120 x 140 x 74, concrete, reinforced, hot water heating.

Simpson Bros., 1811 Beach ave., are ready for tendering on apartments and store, cost $75,000. Architects, Townsend & Townsend, 520 Granville street. Four storeys, full basement, brick, 66 x 64, hot water heating, cafe fitted up.

Tenders will be let shortly for residence, cost $8,500, Cartier & Laurier streets, for Dr. George Telford. Architect, J. P. Matheson & Son, McKechnie Bldg., Victoria. Two and one-half stys., frame, stone basement, hot water heating, two fireplaces.

Victoria, B. C.
Plans are being prepared for ten bungalows, cost $20,000, for Seymour & Hallett. Architect, J. M. Warren, Sayward Bldg., Victoria. It is probable that general contract on all of the houses will be let when architect is ready.

Windsor, Ont.
Tenders will be called for alterations and addition to residence, cost $3,000, Victoria ave., for Gordon McGregor. Architect, Crane & Pennington, Windsor. 16 x 21 ft. addition, stone foundation, brick, frame, new oak floor througout, new bathrooms, 15 x 20 ft. garage (frame). Plans being prepared. Tenders called after January 11th, close January 20th.

CONTRACTS AWARDED

Hamilton, Ont.
Seventy-five workingmen's houses, factory district. Owner and builder, Bennett & Thwaites; contractors, 42 Fairleigh ave., Hamilton. Cost of each

house, $2,000, chiefly of brick construction. Work to be commenced in spring.

Maisonneuve, Que.

Foundations are in for six flats, cost $6,000, for A. Lalonde, 237 Ontario st. Three storeys, 30 x 46, stone construction, stone and cement foundation, stove heating, flat gravel roof. Owner is builder.

Foundations are in for five flats, cost $4,000, for T. Deslongchamps, 127 Lafontaine street. Three storeys, 27 x 45, brick, concrete foundations, stove heating, gravel roofing, electric lighting. Owner is builder. Work stopped for the present.

Montreal, Que.

Residence, cost $3,500, on St. Denis, for Mrs. Azilda Gordon, 2441 St. Hubert street. Builder, Joanis & Smith, 389½ Garnier street, Montreal. Two storeys, 25 x 60, brick encased, stone foundation, hot water heating, gas and electric lighting, gravel roofing. Work not started.

Plans are prepared for three flats, cost $4,500, Clark street, for M. Piul. General contractor, W. Funk, 2411 St. Dominique. Three storeys, 25 x 40, stone foundation, gas and electric lighting, gravel roofing. Work not started.

Toronto, Ont.

Work is in progress for residence, cost $12,000, Indian road and Radford ave., for Mrs. W. F. Sparling, 19 North st. Architect, Curry & Sparling, 90 Yonge street. Builder, J. A. Hewson. Two and one-half stoheys, brick, hardwood floors, sliding doors, mantles, Roman stone, picture moulding.

Two pair dwellings, cost $8,000, St. Clair ave. near Runnymede Road, for F. M. Tuckett, 53 Indian road crescent. Builder, R. Thompson. Two storeys, semi-detached, brick.

Three pairs dwellings, cost $12,000, s.e. cor. Perth and Davenport, for S. Reeves, 181 Perth avenue. Builder, H. Lankin. Two storeys, semi-detached, brick.

Residence, cost $5,700, Northern Pl., for J. Webber, 13 Fenning street. Architect, J. M. Cavan, 65 Adelaide street. Builder, J. Doyle, 43 Shannon street. Three attached brick, tar and gravel roofing, hot air heating, gas lighting.

Residence, cost $11,000, for A. E. Kirkpatrick. Architect, Eden Smith & Son, 199 Yonge street. Carpentry, Sam Hogg, 242 Markham street. Plastering, J. J. O'Connor, 51 Garnet ave. Two storey and attic.

Residence, cost $35,000, St. Clair and Walmer road, for Mrs. Christopher Robinson. Architect, Eden Smith, 199 Yonge street, Toronto. Builder, Fussel & Son, Poplar Plains road. Two storeys and attic, brick and stone, concrete foundation, shingle roof, structural steel, grey Indiana cut stone, stone columns, reinforced concrete floors, plate glass, galvanized iron cornice, oak flooring. Billiard rooms.

Vancouver, B. C.

Residence, cost $25,000, will be erected on Shaughnessy Heights, for Mrs. Dr. MacKay. Architect, W. A. Doctor, 922 Metropolitan Bldg. Contractor, Columbia Construction Company.

Westmount, Que.

Two residences, cost $27,000, Belmont ave., for T. S. Hudson & Co., Basement 12, Board of Trade Bldg., Montreal. Painting and glazing, G. E. Blackwell, 4184 St. Catherine street, Montreal; plumbing and heating, J. A. Gordon, 301 St. Antoine street, Montreal; electric wiring, J. C. Duff, 369 Bleury street, Montreal. Two storeys, 30 x 50, solid plastic brick, concrete foundation, Honeywell system of hot water heating, electric light, gravel roof, hardwood finish, two baths in each and shower bath in one, tile floors. Roofing and plastering not yet awarded.

Business Buildings and Industrial Plants

Belleville, Ont.

Marsh & Henthorn, foundry and machinists, contemplate the erection of new foundry and machine shops. President and manager, L. W. Marsh, Belleville. Brick or reinforced concrete. Company waiting until C. P. R. is located. New building will probably cover two acres.

Belmont, Ont.

E. Agur, Supt. Canadian Milk Products Limited, Brownville, Ont., has been looking for a site suitable for branch factory.

Brandon, Man.

Brandon Construction Co. plan to convert shop into wood-working factory, Sixteenth street and Princess. Work on alterations will start at once; new machinery will be installed.

Calgary, Alta.

Messrs. Shelley are planning to erect a new up-to-date business block on 10th and 11th street west for a bakery, to cost $10,000.

Carleton Place, Ont.

By-law carried to grant fixed assessment to Findlay Bros. Co., Ltd. Large extension to present plant to be started in the spring.

Chatham, Ont.

Tenders will be called for addition to engine room, cost $8,000, King street, for Chatham Gas and Electric Light Company. Architect, J. L. Wilson & Son, Chatham. Two storeys and basement, 61 x 57, cement, brick, stone, reinforced concrete roof, electric light, steam heating, gas engines, motors, electric work. Received by architect after January 18 until January 27.

Fort William, Ont.

Tenders are called for structural steel for tube mill. Representative of company, F. V. Samwell; solicitor, W. E. Buckleigh, Guelph. Tenders for the structural steel work for the four main buildings will be opened on January 15th. It is stated that balance of contracts will go to local men. F. V. Samwell is interested.

Hamilton, Ont.

A site has been secured for machine plant, cost $200,000, on Sherman avenue, for Brown, Boggs & Co., machinists, Victoria ave. and King William street. President, J. M. Brown. Manager, W. E. Blanford. Company in proposed new plant will specialize in manufacture of tools and machinery purchase of large amount of machinery involved in contemplated expansion. No architect chosen.

The United Coke & Gas Company, 17 Battery Place, New York, general manager, Dr. Forrest, is negotiating for purchase of Hamilton Gas Light Company's plant on Park street, also holdings of Ontario Pipe Line Company; also contemplating extension of present buildings, complete re-equipment with modern machinery, erection of large coal chutes handling 500,000 tons annually and replacing many old mains. Deal involves $2,500,000; rough estimates place $500,000 as expenditure on plant, machinery, etc.

Brown, Boggs & Co., machinists, Victoria ave. and William street, are looking for site for machinery plant, cost $200,000, in east end. danager, W. E Blanford. Company in proposed new plant will specialize on manufacture of tools and machinery, purchase of large amount of machinery involved in contemplated expansion. No architect chosen. The firm is seeking increase of capital from $150,000 to $500,000.

Hull, Que.

Mr. H. Dupuis, of the Fleming, Dupuis Supply Company, Chaudiere, Hull, is interested in the proposed erection of cement works on the outskirts of Hull, to cost $1,000,000. Work to commence about March 1st and will be constructed to admit of additions.

Lethpridge, Alta.

A. G. McLean has proposed to council to build a sawmill plant valued at $2,500,000 in return for fifty acres of bottom land on river. G. W. Robinson, clerk.

Listowel, Ont.

Ratepayers voted in favor of granting civic privileges, etc., to Andrew Malcolm Furniture Co., of Kincardine, on the condition that the Listowel Furniture Company's plant be taken over and operated to its limit.

Montreal, Que.

A site has been purchased for contemplated departmental store, containing 8,167 square feet, secured through Robt. H. Bartholomew, 205 St. James street for a syndicate.

200,000 square feet in north end has been purchased through J. S. Brown & Co.; Canadian Bldg., as a prospective site for a fireproof concrete building to be erected in the spring.

Nanaimo, B. C.

Plans are being prepared for bank, cost $15,000, Albert and Wallace streets, for Merchants Bank of Canada. Architect, F. M. Rattenburg, Sayward Bldg., Vancouver. Two storeys, brick.

New Westminster, B. C .

The Canadian Talbot Boiler Company, controlled by local interests, manufacturers of improved marine and stationary boilers, are contemplating the erection of new boiler plant.

Ottawa, Ont.

P. Palip, 8 Adelaide street, is contemplating shops and residences, cost $5,000. Architect, F. Schroeder, Ottawa. Solid brick, concrete foundation, electric lighting, hot water heating.

Owen Sound, Ont.

Machinery is required for saw and planing mill, for John Harrison & Sons & Co., Ltd. Two boilers, not less than 100 pounds steam, 66 in. x 14 ft. Filing room outfit for 12-in. double cutting band saws; one log jack and chain.

Prince Rupert, B. C.

Plans have been prepared for G. T. P. hotel, cost $1,000,000. Supt. of Hotel system, F. W. Bugman, manager Chateau Laurier, Quebec. Architect, F. M.

Rattenbury, Sayward Bldg., Victoria. Main building, 12 storeys; two wings, 9 storeys, steel, brick and terra cotta, reinforced concrete floor slabs, fireproof construction.

Sherbrooke, Que.

Concessions have been granted for brake-shoe factory for The Canadian Brake-shoe Co. P. M. McCullough interested, capital, $100,000. Building to cost $30,000, machinery, $30,000. Free site and exemptions from taxes given by city.

Tilbury, Ont.

Temporary quarters have been secured for Canadian Top Co., Ltd. New machinery will be purchased. Plans for a new factory will be prepared later. It is rumored that factory may move to Chatham. Machinery loss in recent fire was $12,000.

Toronto, Ont.

A permit has been granted for stores and apartments, cost $40,000, for J. Baker, 57 Chestnut street. Three stores, brick, attached.

Plans are contemplated for addition to factory, for John Underwood, ink manufacturers, 88-90 Richmond street east. Architect, Gordon & Helliwell, Confederation Life Bldg. Brick and concrete, structural steel, cut stone, galvanized iron cornice, hardwood floors.

John M. Ayle, architect, 18 Leader Lane, has been awarded the commission in the competition for plans for Stock Exchange, 20 King street east. President, W. H. Brouse, Toronto Stock Exchange. Four storeys, brick, terra cotta, fireproof.

Tenders are open for store and residence, cost $7,500, College street, near Euclid ave., for Angus Gillies, 548 Dovercourt road. Architect, J. H. Stanford, Westmoreland ave. Three storeys and basement, stone and brick, structural steel, cut stone, art leaded glass, galvanized iron cornice, fanlights, hardwood floors. Stable fittings and doors.

Vancouver, B. C.

Plans are being prepared for store, cost $28,000, Cordova street, for Stuart & White, Metropolitan Bldg. Building to be two storeys and basement, 75 x 100, store building.

Plans are being prepared for warehouse, cost $10,000, for Columbia Flooring Mills Co., Ltd., C. P. R. tracks. 1-storey, 50 x 120, concrete and mill construction. Tenders will be called when plans are completed.

Plans are being prepared for garage, on Howe street, for Hoffmeister Bros., Limited, 1155 Pender street. Architects, Donnellan & Marsom, 219 Pender street west. Excavation contractors, Ledingham & Cooper, Carter-Cotton Building, Vancouver. 50 x 120, concrete and fireproof, foundations capable of carrying several storeys.

Plans are prepared for store and apartment building, cost $35,000, Hastings street, for George Woodcock, 537 Broadway east, Vancouver. Architect, A J Bird, Winch Bldg., Vancouver. 4-storey and basement, 50 x 75, hot water heating, laundry on each floor, hot and cold water, metal work, water in 45 bedrooms, two stores on ground floor. Owner is letting contracts.

Victoria, B. C.

Plans are completed for factory, Mosaic tile, cost $15,000, for The Canadian Mosaic Tile Company. Architect, J. M. Warren, Sayward Bldg., Victoria. One storey, 100 x 100, corrugated iron. Ready for tendering in about two weeks.

Stephen Jones, proprietor of Dominion Hotel, is planning to install a new hot water system to supply hot and cold water to 40 rooms in hotel. Kind of system not decided yet. A 6-storey addition to hotel is being discussed.

Plans may be changed for steam laundry, cost $25,000, for Victoria Steam Laundry. Architects, Hutchinson & Ford, Sayward Building, Victoria. Two storeys, 60 x 100. Figures were taken for concrete but plans may call for brick.

Plans are about completed for G. T. P. Hotel for Grand Trunk Pacific Railway, Montreal. Architect, F. M. Rattenbury, Sayward Building, Victoria. Site in possession of company. It is stated work will start early in spring.

Plans will be prepared at once for rebuilding store and office, cost $100,000, Government street, for T. N. Hibbon & Co. Architect, Thos. Hooper, 1108 Government Bldg., Victoria. Five storeys, frontage 50 feet, 6 storeys at back, reinforced concrete. Work will be rushed as soon as plans are ready.

Welland, Ont.

By-law giving fixed assessment to Jas. A. Goodwillie, carried. Large canning factory to be built at once.

Plans have been prepared for erection of hotel for Henrietta Hotel Company. Managing director, C. J. Laughlin, Welland.

Windsor, Ont.

John Curry is planning to remodel three-storey brick building, Ouelette ave. and London street, ground floor to be divided into stores, upper floors into offices. Cost $50,000.

The Frederick Stearns & Company, chocolate company, of Windsor, contemplate a large extension to their present works on Sandwich street. Plans are being prepared.

Yarmouth, N. S.

The Cosmos Cotton Co. are considering the erection of extensive enlargements to their cotton mills.

CONTRACTS AWARDED

Hamilton, Ont.

Extension to Steel Plant, Sherman ave., for Steel Company of Canada, Limited. General manager, Robert Hobson, Hamilton. Engineers, Morgan & Co., Worcester, Mass. Steel contractors, Hamilton Bridge Co., James st. Buildings: new boiler house, rod mill, 83 x 550, bloom and billet mill, 65 x 400, gas producing building, 50 x 400, open crane railway building, 50 x 400. Total cost, $140,000; concrete, steel and corrugated iron construction. Excavating, $200,000 to be spent on new machinery.

New brew house, cost $6,000, adjoining brewery, Bay street north, for Hamilton Brewing Association. Architect, Stewart and Witton, 2 Hughson street, Hamilton. Masonry contractor, Geo. E. Mills, 614 King street east. Booth-Coulter Cooper & Brass Company, Limited, will supply copper vats and other equipment.

New dairy building on Vine street, for Hamilton Dairy Association. President, D. U. Flatt, Somerhill Stock Farm, Millgrove, Ont. General contractor, George F. Webb, office, head of Wentworth st. Construction, 90 x 42, one storey and basement. Contract for machinery has been let to Chicago firm.

Montreal, Que.

Offices and stores, on Notre Dame and St. Sulpice streets, for J. O. Gravel, 59 Mansfield street, Montreal. Architect, Hutchinson, Wood & Miller, Royal Insurance Bldg., Montreal. General contractor, C. E. Deakin, 11 St. Sacrament street, Montreal, $147,000. Ten storeys, 50 x 75, stone, brick, steel, concrete, Ohio sandstone, grey canyon or limestone facing, steam heating, electric lighting, gravel roofing.

Saskatoon, Sask.

Additions to Empire Hotel, cost $80,000, 20th street. Contractor, B. Lancaster, Saskatoon. Wing, 4-storey, 40 rooms, hot and cold water connections, telephone system, baths in 30 rooms. Rotunda and dining room to be enlarged and cafe installed.

Toronto, Ont.

Store, cost $6,000, 717 Queen street E., for Jas. A. Bleakley, Queen street east. Builder, Griffiths & Scott. Two storeys, brick, stone foundation, tar roofing, Roman stone, plate glass, shelving.

Vancouver, B. C.

Warehouse, hardware, cost $85,000, Shanghai Alley, for Wood, Vallance & Leggatt, 23 Hastings street west. Contractors, Geo. Snider & Brethour, Dominion Trust Bldg. 3-storey, 120 x 120, concrete.

Windsor, Ont.

Excavation is done for addition to stores and storage, cost $15,000, Chatham street, for The Windsor Truck & Storage Co. President, A. B. Lewis. Architects, Crane & Pennington, Windsor. Carpentry, O. Jacques, Windsor; painting and glazing, W. Laesser, Windsor; plumbing, Pennington & Brean, Windsor. Three storeys, 50 x 100, brick with stone trimmings, concrete foundation, steam heating, electric lighting, prepared roofing, southern pine interior finish, freight elevator. Heating contract not yet awarded.

Winnipeg, Man.

Alterations to warehouse, boots and shoes, cost $10,000, on Princess st., for Thos. Ryan & Sons. Contractors, C. W. Sharp & Sons, 222 McDermott avenue, Winnipeg. Partitions and changes to interior; steam heating to be installed. Apply to contractors.

Power Plants, Electricity and Telephones

Aylmer, Ont.

The South Malahide Telephone Co. are open for tenders for supply of telephone line material, cables, poles and guy wires, made necessary by the placing of individual and party lines in cables.

Fredericton, N. B.

Plans are filed for power development on Eel River, for Eel River Light, Heat & Power Co., Fredericton. Secretary, R. G. Lee. Plans with Provincial Government for expropriation of land required for flooding. Engineer Ferguson's report showed 3,500,000 kw. per year. Company preparing to complete development of power at Eel River to furnish power to surrounding district, including Fredericton & C. P. R. shops at McAdam Junction.

(Continued on page 78)

Tenders and For Sale Department

To Engineers

Every man who puts in a tender on your jobs has got to see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

More contractors and manufacturers read the "Contract Record" than any other Canadian publication. It is the logical place to look for tenders called, and where all important works are advertised.

Send along your plans for your next job and put a line in your ad. to that effect.

Contract Record

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—441 Seymour Street.

Tenders Wanted

Tenders wanted on all trades for two houses at Centre Island.

Plans and specifications at G. M. Miller & Co., Architects, Toronto. Tenders must be in by the 25th inst. The lowest or any tender not necessarily accepted.

City of Calgary, Alberta

Tenders for Bridge

Sealed tenders marked "Tenders for Bridge," addressed to the City Clerk, Calgary, will be received up to noon of **10th February, 1912**, for the supply of material and construction of a Steel Bridge, 30 feet wide, in three spans of 150 feet each, on concrete substructure, across the Bow River, within the city limits.

Plans and full information at the office of the City Engineer, Calgary.

Each tender to be accompanied with a marked bank cheque payable to the City Treasurer for the amount of $500, which will be forfeited should any party whose tender is accepted fail to execute the contract. The cheques of unsuccessful tenderers will be returned.

The lowest or any tender not necessarily accepted.

CITY COMMISSIONERS,
Calgary, Alta.
3-6

TENDERS
for Bridge Construction

Sealed tenders plainly marked as to contents will be received at the office of the undersigned up to two o'clock p.m., of **Wednesday, January 31st, 1912**, for the construction of Concrete Abutments and a Steel Bridge, 100 feet clear span, and also for a Reinforced Concrete Truss Bridge, 50 feet clear span, over the Burnt River in the Village of Haliburton, in the Municipality of Dysart.

Plans and specifications may be seen and all necessary information may be obtained at the office of the undersigned, 57 Adelaide street east, Toronto.

The lowest or any tender not necessarily accepted.

FRANK BARBER,
Civil Engineer.
Toronto, January 10, 1912. 3

Sewer Excavator

For sale for immediate use, a Vulcan "Little Giant" Steam Shovel with extra long dipper handle for excavating to 16 feet below surface, mounted on traction wheels, dipper 1¼ yd. capacity. Machine just overhauled; new chain, and extra large new boiler; weighs 32 tons; low price. Address

WILLIS SHAW MACHINERY Co.,
39 South LaSalle Street,
Chicago, Ill.
42-t.f.

New
Parliament Buildings
Winnipeg, Man.

The Government of Manitoba will receive competitive drawings for New Parliament Buildings to be erected in the City of Winnipeg.

Copies of regulations governing the competition may be obtained from Mr. James Hartney, 77 York Street, Toronto.

COLIN H. CAMPBELL,
Minister of Public Works.
2-2

TOWN OF SOURIS

Water Works Debentures For Sale

Sealed tenders addressed to the undersigned will be received up to 6 o'clock p.m., February **12th, 1912**, for the purchase of $93,570.12 30-year Debentures with coupons attached, dated December 1st, 1911, bearing 5 per cent. interest payable in annual instalments of principal and interest, Debentures shall be made payable at the Merchants Bank of Canada, at Souris, Man.

The lowest or any tender not necessarily accepted.

For further particulars apply to

J. W. BREAKEY, Sec.-Treas.,
Souris, Man.
3-4f

TOWN OF SOURIS

Sewer Debentures for Sale

Sealed tenders addressed to the undersigned will be received up to 6 o'clock p.m., February **12th, 1912**, for the purchase of $28,000 30-year Debentures with coupons attached, dated December 31st, 1911, bearing 5 per cent. interest payable in annual instalments of principal and interest, Debentures shall be made payable to bearer at the Merchants Bank of Canada at Souris, Man.

The lowest or any tender not necessarily accepted.

For further particulars apply to

J. W. BREAKEY, Sec.-Treas.,
Souris, Man.
3-4f

Contract to Let

Parties having about 60 or 70 miles of heavy ballasting and trainfilling to do, are willing to sub-let the work to substantial people provided same will rent rolling stock. Lidgerwood and cars now on hand. Apply Box 402, Contract Record, Toronto, Ont. 1-4

For Sale

Ayr electric light plant in first class condition, steam power, good service and contracts. Exclusive franchise in town of 1,200. A splendid chance for a practical man. Being sold because of owner's death. Apply D. M. Clark, 15 McKenzie Crescent, Toronto, Ont. 2-4

Miscellaneous

Advertisements under this heading two cents a word per insertion. Minimum charge 50 cents

Large United States firm manufacturing transits, levels, and complete line of engineering and architectural instruments, wants Canadian representatives. Apply Box 398, Contract Record, Toronto, Ont. 52-2F

Tender for School Building

The Brantford Public School Board ask tenders for the completion of a new ten-room school on Chestnut avenue.

A cash deposit of five per cent. by marked cheque to the order of the Treasurer of the Board must accompany each tender.

Tenders will require to be in the hands of the undersigned at his office in the City Hall, Brantford, by 12 o'clock noon on Saturday, the 27th day of January, 1912.

Plans and specifications and conditions of tender may be seen at the office of Taylor & Taylor, architects, Hope Building, Brantford.

A. K. BUNNELL,
Secretary-Treasurer.
Brantford, Jan. 5, 1912. 2f

Tenders Wanted

Sealed tenders and marked "Tender," and addressed to Wm. Lane, Goderich, Ont., or to the undersigned will be received until noon on **January 23rd, 1912.**

For the manufacture and erection of a steel bridge to be erected over a branch of the Maitland River on the boundary of Hullett and McKillap Townships, County of Huron, about three miles from Seaforth, a station on the G. T. R.

Bridge to be designed according to Ontario Government Specifications, 1905.

Pratt truss, 100 feet clear span, concrete floor, or Warren truss, 90 feet clear span, concrete floor.

Width of roadway 16 feet.

Distance from floor to bed of stream 13 feet.

Strain sheet and accepted cheque equal to 10 per cent. of contract must accompany tender.

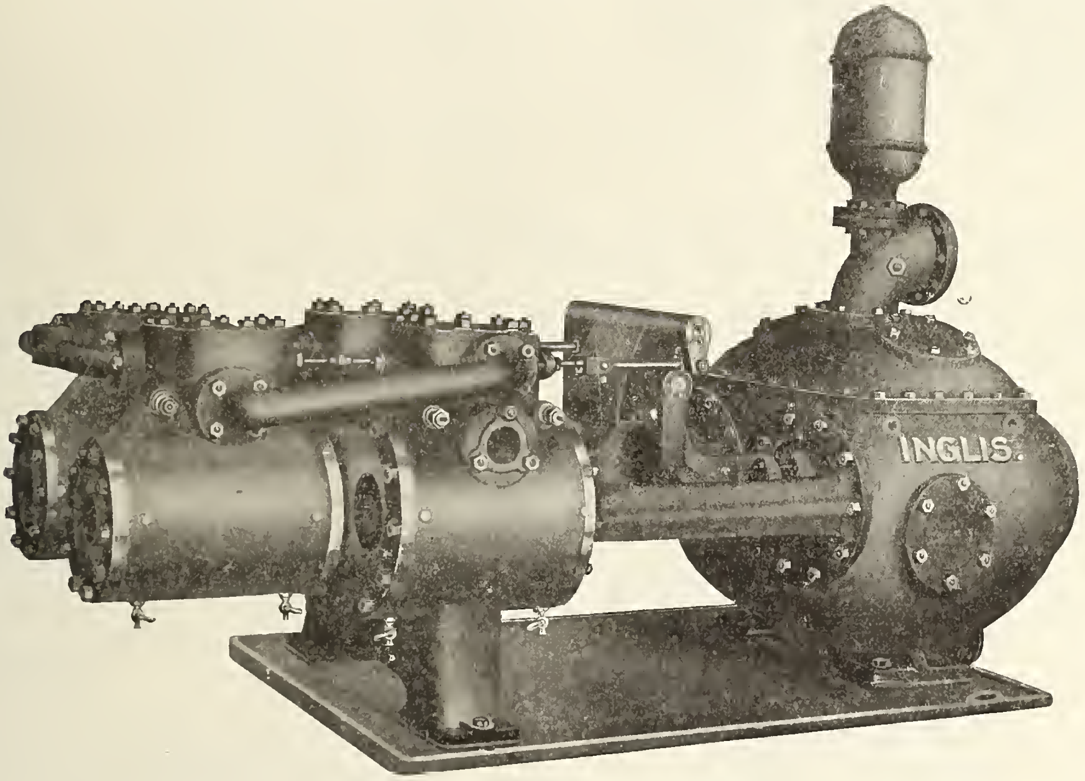
The lowest or any tender not necessarily accepted.

Bridge to be completed on or before the 15th day of August, 1912.

D. PATTERSON,
County Commissioner,
Auburn, Ont.
Dated, Jan. 3rd, 1912. 2F

Water-Works Plants

for Towns and Cities



"Inglis" 1,000,000 gall. Pumping Engine.

Our long and successful experience in the building and installation of Pumping Engines and Water Works Machinery should be a strong argument in favour of "Inglis" products. During the fifty-two years (52) our plant has been in operation, we have built many Pumping Engines, all of which have given entire satisfaction.

Capacities from one to thirty million gallons per 24 hours.

Send us your inquiries.

The John Inglis Company

Engineers and Boilermakers Limited

14 Strachan Ave., TORONTO, Canada

Power Plants, Electricity and Telephones

(Continued from page 75)

London, Ont.

The Board of Education, W. W. Gammage is in charge of project, to install telephone system in every school. It is stated a large quantity of electrical equipment will be required.

Miscellaneous

Belleville, Ont.

The City of Belleville, Chief Campbell, Chairman of Fire Committee, City Hall, are planning to improve the fire service. An old engine to be put into shape for use. It is thought it will be only of temporary value. A regular paid service is to be inaugurated which will probably entail further equipment.

Brandon, Man.

City of Brandon Fire Department plan to purchase motor hose and ladder truck. Chairman Fire and Light Committee, Ald. G. B. Coleman.

Ottawa, Ont.

Fire Chief Graham will ask the Bd. of Control to frame a by-law to have all apartment houses in the City of Ottawa fitted with fire escapes.

Dominion Government main estimates for 1912:—

Port Arthur and Fort William harbor improvements, $1,000,000; Levis wharf, $150,000; improving River St. Charles, $500,000; St. John, $1,000,000; Tiffin harbor improvements, $137,000; Victoria Harbor, Ont., $164,000; Victoria (harbor) B. C., $50,000; Vancouver, $500,000.

Toronto—New Customs House, $300,000; harbor improvements, $195,000; Dominion Building, Canadian National Exhibition, $100,000; barracks for permanent corps, $1,000,000; military stores building, $75,000; additions and alterations to post office, $14,000; garage for motor trucks, $15,000; Dominion buildings, repairs, $5,000.

N. T. Ry., $25,000,000; Quebec bridge, $1,000,000; Welland Canal surveys, $50,000; Trent Canal, $1,900,000; P. E. I. car ferry and P. E. I. Ry., $400,000· Department of Agriculture branch experimental stations, $200,000.

Port Colborne—Elevator extension, $200,000; breakwater, $75,000; general improvements, $145,000.

Rodney, Ont.

An agitation is on foot since the second serious fire here for the purchase of efficient fire fighting apparatus. John D. Shaw, clerk.

St. Mary's, Ont.

The Mayor. Mr. Sanderson, and Council, contemplate the purchase of quantity of electrical apparatus.

Vancouver, B. C.

The following are the recommendations of Fire Chief Carlisle for 1912: Four hose wagons, $26,000; two city service trucks, $26,000; one water tower, $14,000; three pumping engines, $42,000; one life boat, $125,000; one pumping station with pipe around False Creek, $150,000; salvage wagon and equipment, $7,000. Three new stations are also recommended.

New Companies

H. M. Lickley, Limited, Gravenhurst, Ont., incorporated with a capital of $100,000 to acquire and develop timber limits. operate sawmills and carry on business as timber merchants, etc. Provisional directors, Thomas Hubert Wilson, Wm. Howard Smith, and Robert Verity, all of Toronto.

Guelph Realty Co., Ltd., Guelph, Ont., incorporated with a capital of $50,000, to carry on a general land and building business. Provisional directors, Robert G. Johnston, Walter E. Buckingham and Wm. Henry Jones, all of Guelph.

Ontario Lime Company, Limited, Toronto, Ont., incorporated with a capital of $500,000, to carry on business as a general land and building company. Provisional directors, John A. McAndrew and Wm. H. Irving, of Toronto.

The St. Catharines Realty and Building Company, Limited, St. Catharines, Ont., incorporated with a capital of $40.000, to carry on a general land and building business. Provisional directors, Albert W. Tavlor, Edwin C. Graves and Jas. K. Kernahan, all of St. Catharines.

The Algoma Steel Bridge Company, Limited. Winnipeg, Man., incorporated with a capital of $40,000, to carry on business as bridge builders, contractors, etc. Incorporators, Alex. Bayne, Martin McCollum and Melvin Bailey Stone, all of Minneapolis, Minn.

Argenteuil Granite Company, Limited, Montreal, Que., incorporated with a capital of $250,000, to carry on business as quarrymen, general engineers, builders, contractors, etc. Incorporators, George A. Campbell, Geo. L. Alexander, and Horm Lajeunesse, all of Montreal.

Alabama Traction, Light and Power Company, Limited, Montreal, Que., incorporated with a capital of $30,000,000. Incorporators include Gordon W. MacDougall, K. C., Lawrence Macfarlane, Robt. Edwin Moyse and Reginald W. Plimsoll, all of Montreal.

The Beaver Company, Limited, Ottawa, Ont., incorporated with a capital of $500,000, to manufacture and deal in wood pulp, timber wood sheeting papers, roofing and other building materials. Incorporators, Harry Riley, Willis Bertram Stirrup, and John Fraser MacGregor, all of Toronto.

Provident Freehold and Realty Company, Limited, Montreal, Que., incorporated with a capital of $200,000, to carry on business as builders and contractors, dealers in stone, cement, lumber and other supplies. Incorporators, E. Edwin Howard, Henry U. P. Aylmer and Alex. M. Stewart, all of Montreal.

Westmoreland Company, Limited, Montreal, Que., incorporated with a capital of $200,000, to carry on a land and building business. Incorporators, Jos. Israel Fortier, Ludger Goulet and Edouard N. Hebert, all of Montreal.

The Mechaniss Supply Co., Ltd., Quebec, Que., incorporated with a capital of $300,000, to manufacture and deal in engineers, plumbers and contractors' supplies, etc. Incorporators, Wm. Henry Wiggs, Guy Henry Simpson and Walter R. Wilkinson, all of the City of Quebec.

La Fonderie de Jonquiere, Limitee, Jonquieres, Que., incorporated with a capital of $20,000, to manufacture and deal in all kinds of construction materials. Incorporators, Adelard B. Ladouseur of St. Cyriac, Auguste Remi Hudon and Jos. M. Hudon, of Hebertville Station.

Business Notes

Brucefield, Ont.

Grand Trunk Railway station is badly damaged by fire. Extensive repairs to be made at once.

Cobalt, Ont.

On the 7th inst. fire destroyed the general store owned by Gibson Bros. at Golden City. Loss $60,000.

Holland Landing, Ont.

The public school was destroyed by fire on the 8th inst. Insurance $3,000.

Montreal, Que.

The Dominion Button Works, proprietor, S. L. MacBean, 728 Visitation street. Two-storeys brick building gutted by fire on January 7th. Machinery badly damaged. Loss estimated at $25.000.

On January 6th fire damaged the interior of shop ocrupied by J. Laurier, plumber; the tailoring shop of A. C. Favreau was damaged by water. Damage to building, $3,000; to machinery and stock, $2,000.

On January 6th fire did damage estimated at $3,500 to the 3-sty. brick house occupied by R. Gingras, 406 Timothy st. Six flats on Sherbrooke and Plessis streets, belonging to G. W. Faust, 760 Sherbrooke street east, damaged by fire on January 6th to the extent of $10,000.

Revelstoke, B. C.

On January 1st fire destroyed rink here owned by Ald. McKinnon and others. Loss $10,000.

Rockwood, Ont.

The Grand Trunk Railway Company's station burned. New building to be built in spring.

Sandwich, Ont.

Alex Abar's tenement house completely destroyed by fire. Will probably be rebuilt this year.

Sombra, Ont.

St. Clair Hotel. Building completely destroyed. It is stated that a large new hotel will be erected in the spring. Owner, J. James Smith.

Toronto, Ont.

Fire totally destroyed the fancy dry goods warehouse belonging to Boyd, Brummell Co., Ltd., 11 Wellington st. west. Loss $150,000. The dry goods warehouse of Robinson & Dale, 9 Wellington street west, was damaged to the extent of $35,000.

Welland, Ont.

Transformer station of Michigan Central Railway burned; local agent, J. D. Payne. Loss $10,000. Building will be re-built.

Winnipeg, Man.

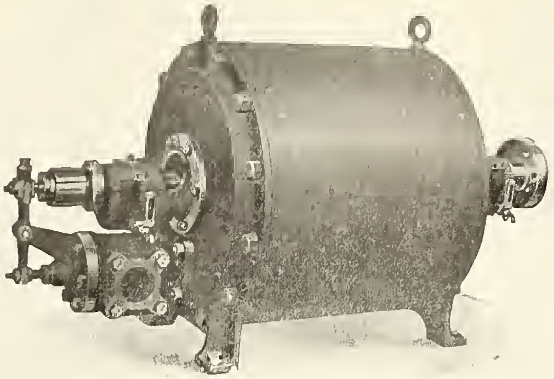
Motor Works, stores, residences, etc., on Garry street. burned. The following suffered loss: Excelsior Motor Works, 237 Garry street, plant and building. Charles Sharp, two stores, 231 and 233 Garry street; Hugo Carstens, three houses, 223-29 Garry street, loss $8.000; Taylor Paint Co., 233 Garry street, damage slight; Winnipeg Automobile School, loss $3,000. Total loss on buildings, so far estimated, $75,000; on automobiles, $40,000.

Kerr Turbo-Pumps

for Power Plants

Kerr Turbo-Pumps are in a class by themselves for feeding boilers, circulating condenser water, for fire service, general water supply, etc.,

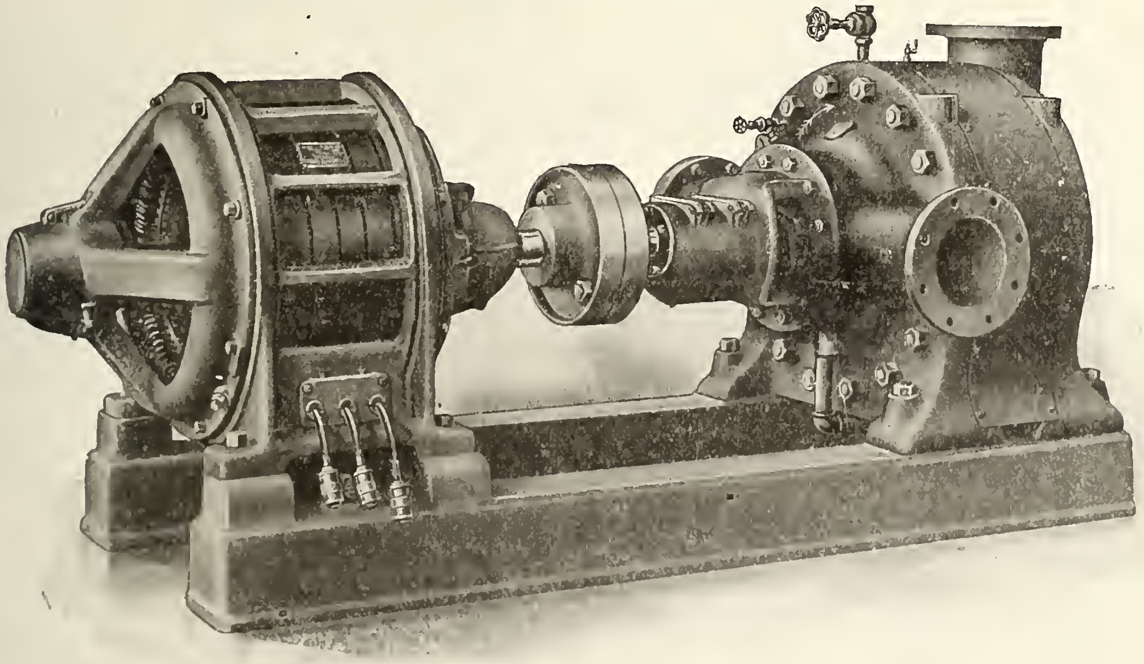
A Kerr Turbo-Pump is simplicity itself compared to any single or duplex reciprocating pump —smaller, no unbalanced parts, fewer places to use oil and waste, no adjustable parts to get out of order, no close fitting parts inside where wear can increase the consumption of steam, and always ready to start on short notice. There is no clicking noise, no vibration to necessitate a heavy foundation, and above all *no oil gets into the exhaust steam.* If interested, ask for Turbo-Pump Bulletin No. 20.



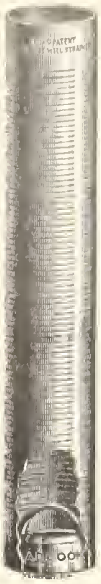
Kerr Steam Turbine

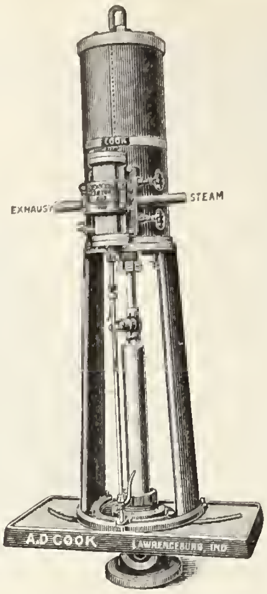
THE JOHN McDOUGALL
CALEDONIAN IRON WORKS CO.
LIMITED
WORKS: **512 WILLIAM STREET, MONTREAL**
Sales Offices: MONTREAL TORONTO COBALT WINNIPEG CALGARY VANCOUVER

Electrically Operated Turbine Pumps for All Duties



CANADA FOUNDRY COMPANY, Limited
TORONTO MONTREAL HALIFAX OTTAWA COBALT WINNIPEG CALGARY VANCOUVER NELSON





Water Supply from Deep Wells

is obtained at a minimum cost by use of our deep well pumps.

Write for Bulletin 26 explaining the use of Cook's Patent Brass Tube Well Strainer.

A. D. COOK

Lawrenceburg, Indiana, U. S. A.

Manufacturer of a Complete line of **DEEP WELL SUPPLIES** including Steam, Belt and Motor Driven **DEEP WELL PUMPS**, Wind-mill and Hand Pumps, Working Barrels and Valves, Pump Rods and Pump Rod Joints, Drill Rods and Drill Rod Joints, Drilling and Well Tools.

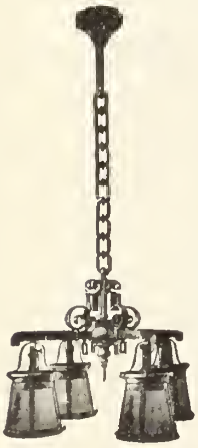
CATALOGUE MAILED UPON REQUEST.

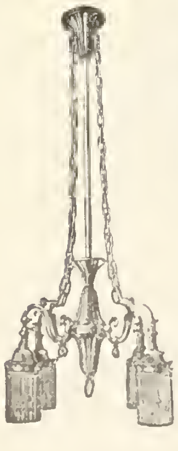
Tenders Wanted

should be advertised for in the CONTRACT RECORD "Tenders and For Sale Department." This paper is the "Tender Ad." medium of Canada and always brings bids from the reliable contractors and supply houses.

File your plans for any work you are inviting bids on, in our offices at Toronto, Montreal, Winnipeg or Vancouver.

Contract Record
Toronto - Ontario





MODERN GAS FIXTURES

MODERN gas lighting means the use of efficient and artistically beautiful gas lamps obtainable at the present time, in distinction from the common ordinary open gas flame. This improvement is all due to the wonderful scientific discoveries of Dr. Auer Von Welsbach, whose name is now a household word wherever light is used.

Builders, home owners and architects are realizing as never before the need of a uniform system in home and building illumination, straight gas or combination gas and electric fixures are now looked upon as the ideal. We want every person interested in home building to consult us about this question. Don't wait until you're sorry.

CONSULTATION FREE

DEMONSTRATION AND SALESROOM

The Consumers' Gas Company

12-14 ADELAIDE ST. WEST PHONE MAIN 1933

SEND FOR OUR REPRESENTATIVE FOR FULL PARTICULARS

Have You Seen Our New

CATALOG?

It's a beauty, and the largest and best catalog of

Hoisting Machinery

ever published in Canada.

And why should it not be the Best Catalog, for does it not describe the Best Hoisting Machinery made in Canada?

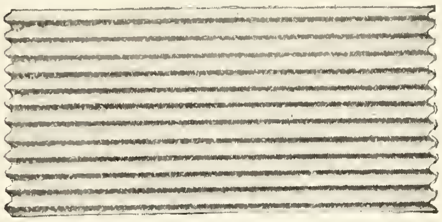
This book also shows a splendid assortment of Derricks and Derrick Parts, Steel Buckets, Steel Skips and Steel Cars, and many other articles used in connection with Hoisting Machinery.

If you are interested in these goods drop us a line, so we may mail you one of these fine catalogues. You will not be sorry.

Marsh & Henthorn, Limited
Belleville, Ont.
Makers of Hoisting Machinery
Sales Agents: MUSSENS Limited, Montreal

Corrugated Iron

BLACK, PAINTED OR GALVANIZED
Straight or Curved
Stock carried of all gauges, lengths up to 10 feet.

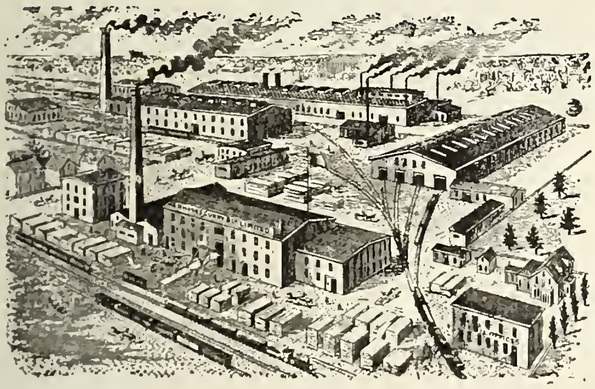


RIDGES FLASHINGS CLEATS BOLTS
and all other necessary sundries.

We Specialize on
Curved Sheets for Concrete Supports

The Metallic Roofing Co. LIMITED
Manufacturers
TORONTO, ONT. WINNIPEG, MAN.
(33)

Rhodes, Curry Co., Limited
Lessees



Bank and Office Fittings

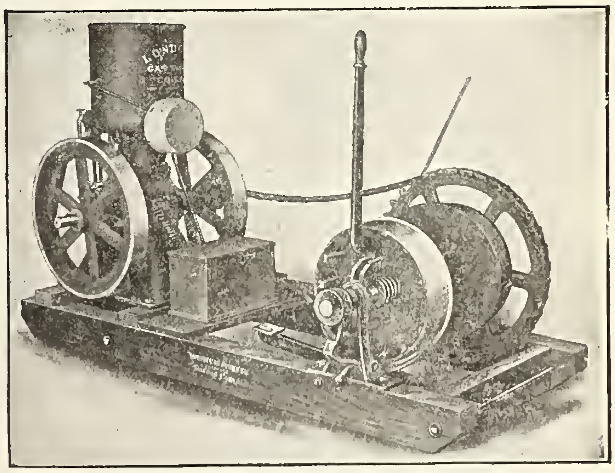
SCHOOL DESKS A SPECIALTY

We manufacture all kinds of building materials, including cast iron columns, cresting, sash weights, etc.

In addition to our large stock of native lumber, we are now carrying about one million feet of foreign lumber, including oak, walnut, ebony, whitewood, basswood, red cedar, Douglas fir, mahogany, &c.

Rhodes, Curry Co., Ltd. Amherst, N. S.
BRANCHES AT
Halifax Sydney

Do You Want a Good Hoist?



Patent Applied For

"London" Friction Clutch Hoist

Here are a few of its many uses

Contractor's Work	Mortar Conveying	Well Digging
Bridge Building	Sewer Building	Pile Driving

This hoist can be used with any make or style of gas, gasoline or oil engine

The London Gas Power Co., Limited
Engineers and Machinists London, Canada

Diamond Sash

particularly suited for Gothic and Queen Ann style windows. It is impossible to successfully manufacture these sash without the proper machinery, but we have it. Every light is uniform, the joints are perfect and all the lines are absolutely straight where they should be and uniformly curved in the curved parts.

M. Brennen & Sons Mfg. Co., Ltd.
HAMILTON, ONTARIO

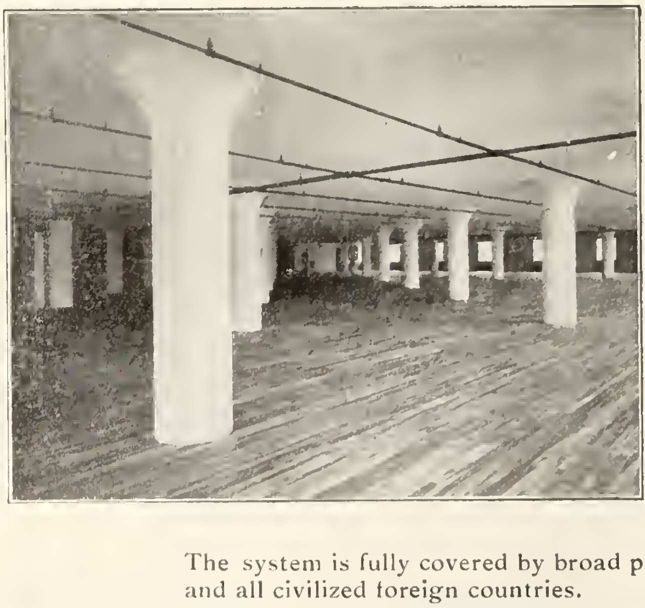
Doud's Controllable Centre Dump Bucket

Designed especially for transporting and depositing concrete in forms where the work is such that the material must be under CONSTANT AND PERFECT CONTROL.

This bucket has a large opening at the bottom and straight sloping sides, no cross rods or other parts to hinder discharge of material.

THE
Acme Equipment & Engineering Co.
1032 Garfield Building, CLEVELAND, OHIO

SELLING AGENTS
The Dominion Equipment & Supply Co., Winnipeg, Canada



The Mushroom System

Of Reinforced Concrete is strong, economical and durable. Based on scientific principles, every pound of steel does the work it is designed to do.

The system is fully covered by broad patents in Canada, the United States, and all civilized foreign countries.

For lists of buildings, descriptive literature and estimates, address

C. A. P. Turner, M. Am. Soc. C. E.
816 Phœnix Building, Minneapolis, Minn.

Wells & Gray Limited

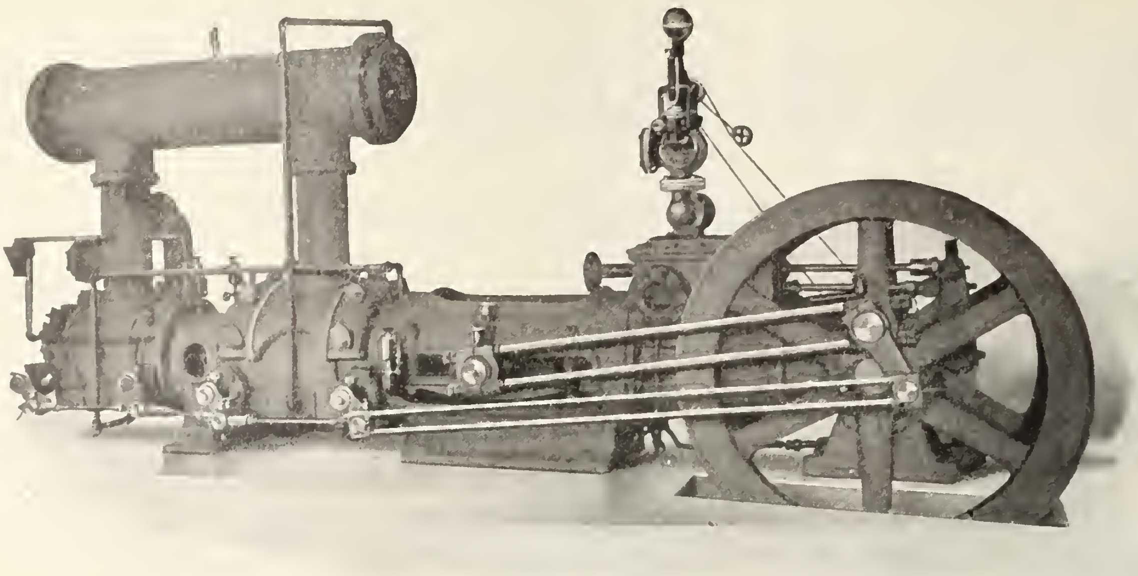
Engineers and Contractors

TORONTO - - ONTARIO

Reinforced Concrete Warehouse 100 x 100 ft. five storeys and a basement built for INTERNATIONAL HARVESTER COMPANY, at CHATHAM, ONT.

Work started on concrete footings June 16, 1911. Building complete September 30, 1911. Built in 16 weeks.

We have the organization, plant and experience to do good work in the least possible time.



FACTS THAT SHOULD **INTEREST**

Compressed Air Users

The above illustration is one of our 744 foot compound straight line air compressors. There are a great many features of economy and convenience embodied in this design which make it a most desirable type for a wide variety of duties.

The air cylinders are designed with large, free, cool ports and unusually large valve areas, insuring the admission and discharge of the air with the least possible resistance. The ports are controlled by Rand-Corliss inlet valves of the most improved type. Discharge valves are of the "Imperial" Direct-Lift Oil-treated type, easily accessible and very reliable.

Every element is designed to give satisfaction and high efficiency.

The machine is provided with a combined speed and pressure governor. The speed-governing element is driven by a belt, while the pressure element is connected by a pipe to the air receiver. The design is such that the speed is always under the control of the air pressure, thus maintaining steady air pressure and enabling the machine to run very slowly without stopping.

The steam cylinder embodies many advantages. The ports are short and direct, and of large cross-section. The exhaust passage in particular is designed to reduce back pressure to the limit.

The cylinder barrel and steam chest are protected against radiation by a sheet-steel lagging.

The steam valves are provided with special ports and are designed to automatically take up wear of all surfaces, insuring a permanent condition of tight valves and low friction. Adjustment of the cut-off may be made from one-third to three-quarters stroke, while the machine is in operation.

These and other advantages of this steam cylinder mechanism combine to make it very economical in steam consumption and most reliable in its simplicity.

The cost per foot of air delivered year after year is more important than the initial cost of a machine.

CANADIAN **RAND** COMPANY

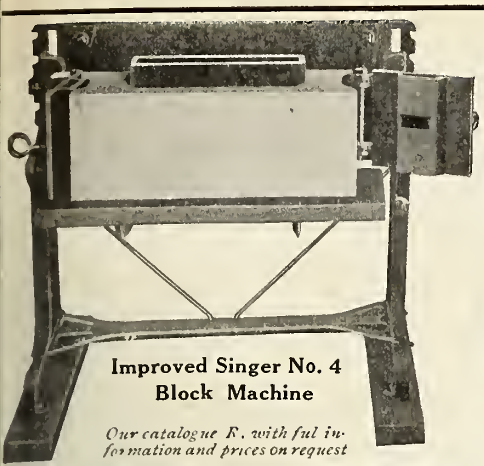
LIMITED

COMMERCIAL UNION BUILDING

MONTREAL - CANADA

Toronto Cobalt South Porcupine Winnipeg Lethbridge

Rossland Vancouver Sydney Spokane, Wash.



Improved Singer No. 4
Block Machine

Our catalogue F, with ful information and prices on request

It Makes
**Face Down
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Blocks 4", 6", 8" 10" 12", 16" and 20" long.
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All Blocks on One-size Pallet.

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Furnished and applied—under our direct supervision and guarantee—to any class of buildings, flat or steep surface.

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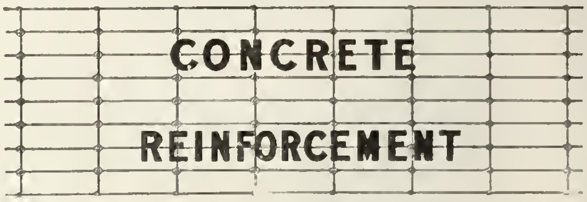

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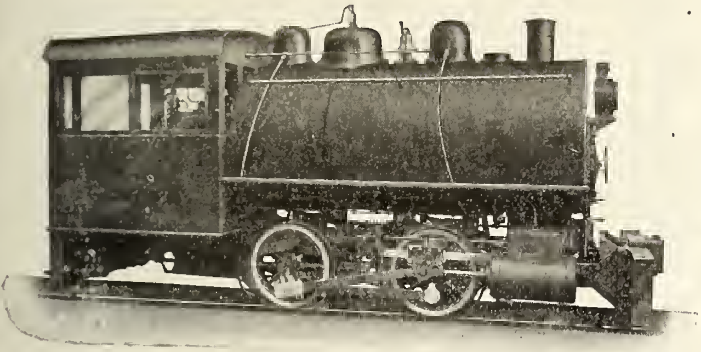

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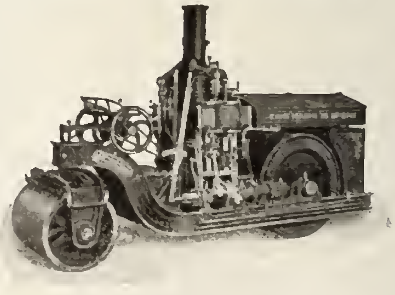

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Is on wheels and can be easily moved about. Supplies hot gravel and hot tar from the one fire.

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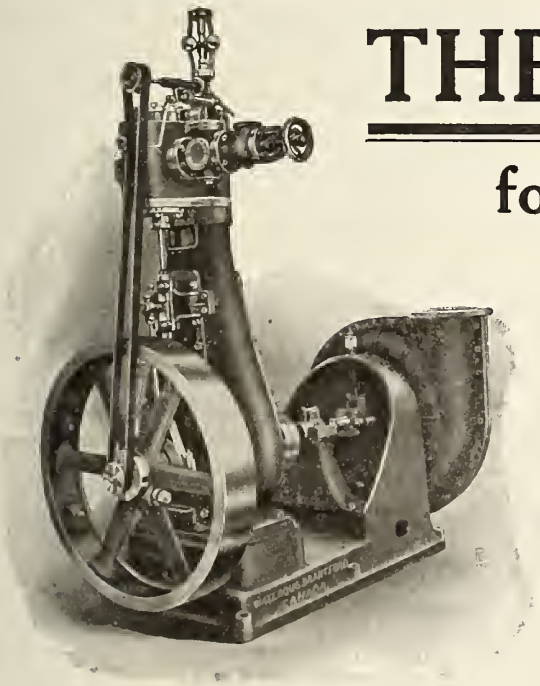

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In this pump and engine we offer a pumping outfit that for simplicity, strength and general efficiency cannot be bettered.

The pump section is our standard pump design with reversible runner, rim split shell, bronze packing gland and split base. **The engine**, direct connected to pump, is a vertical high-speed single crank type, entirely enclosed and self oiling, fitted with "Sweet" balanced and double-ported slide valves and built on duplicate part system.

Simple to install and to operate this pump unit requires small space and can be depended upon to work full shift day after day with little attention, other than occasional overhauling for cleaning and lubrication. Built in nine pump sizes, from 4-in. to 14-in. diameter discharge opening.

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Note tremendous metal weight on this floor. Entire building of Alsen's Cement reinforced concrete

Alsen's Cement

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Put on a wall two sheets of lath, one the ordinary kind and one of Herringbone. Mix your plaster too wet and without sufficient hair. By varying your mix you will easily find a plaster which will drop badly from the back of the ordinary lath but will not drop from the Herringbone.

Herringbone Lath gives the best key

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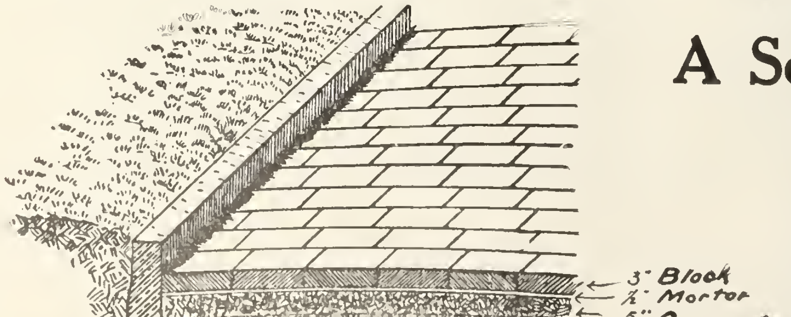

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These requirements are met by
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Easily installed and securely connected with our Forged Steel Flanges or All Steel Bolted Joints.

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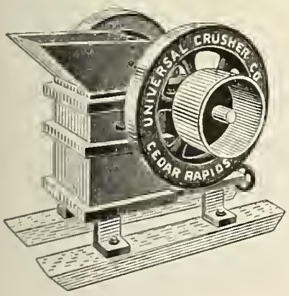
Because of its Forced Feed and Forced Discharge the Universal is SUPERIOR FOR FINE AND UNIFORM CRUSHING To Any Other Machine in the World.



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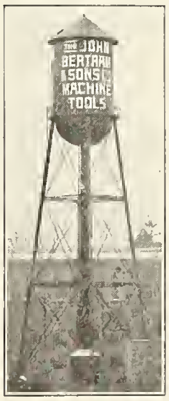

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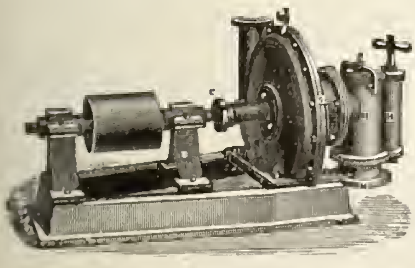

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Mine Hoists, Hoisting Engines
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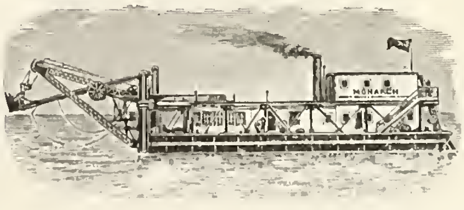

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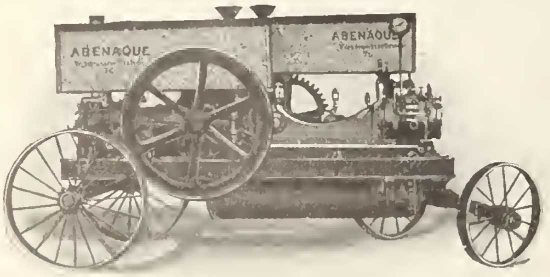

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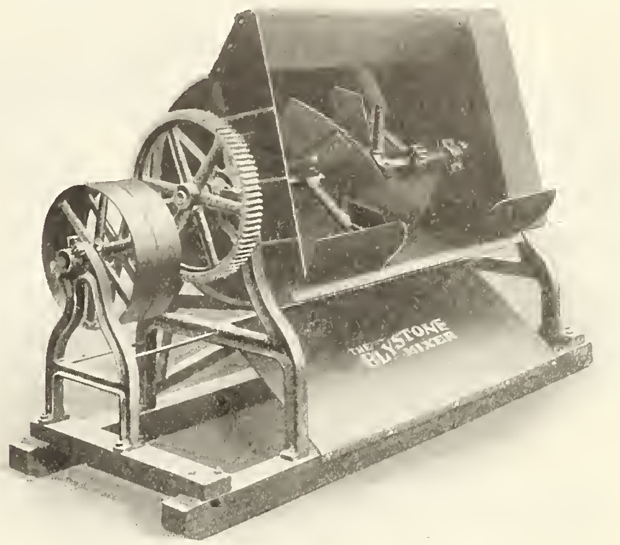

BLYSTONE SKID MIXER

showing the Batch Mixer on skids for shop use. In position for discharging the material.

This machine is equipped with speed reducing gear, tight and loose pulleys, and can be belted direct to the power. Simple, efficient and easily cleaned. Specially well adapted for Brick, Block or Tile plants. The Blystone Batch Mixer is also mounted on hand trucks and mounted with power for outside use.

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It contains no scattered steam piping to freeze or leak.

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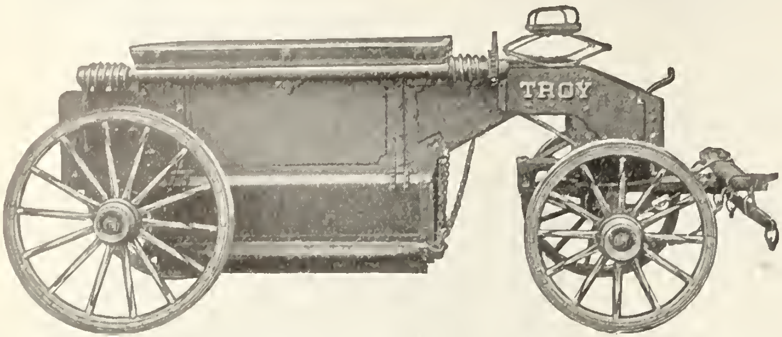
Adv. No. 868



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Resolve to do your hauling cheaper than you did last year.

Use TROY Specials and get your costs down to rock bottom. Your teams can make more trips—the Special is lighter running. Your men can load it quicker—it's lower down. And it never can get out of order. The price is **Right.**

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PILE DRIVERS
VULCAN IRON WORKS CHICAGO ILL., U.S.A.
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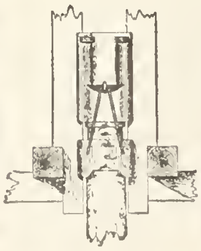
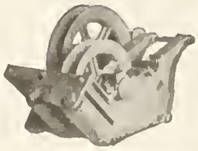
Steam Hammer



Casgrain Pile Cap



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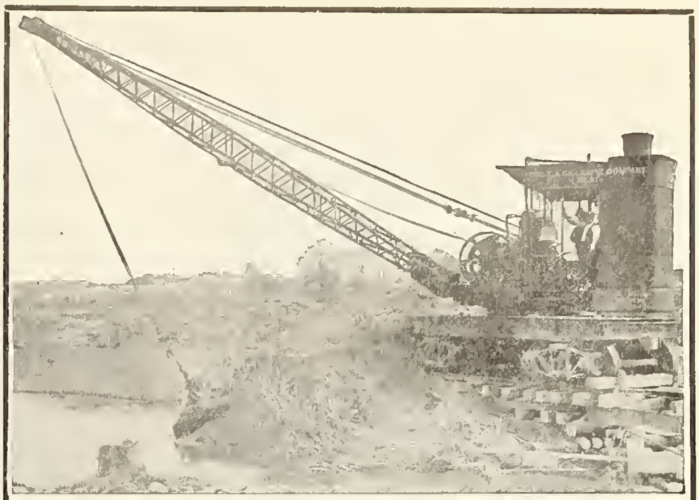

BROWNHOIST

Locomotive Cranes on Construction Work

The one shown here is working on the New York State Barge Canal equipped with a scraper bucket. These cranes are used from the beginning to the end of a construction job. They do the excavating with any style bucket; drive the piling; deposit all concrete both to elevated forms and to trenches; handle the sand, gravel, crushed stone, heavy timbers and steel sections; and switch the cars.

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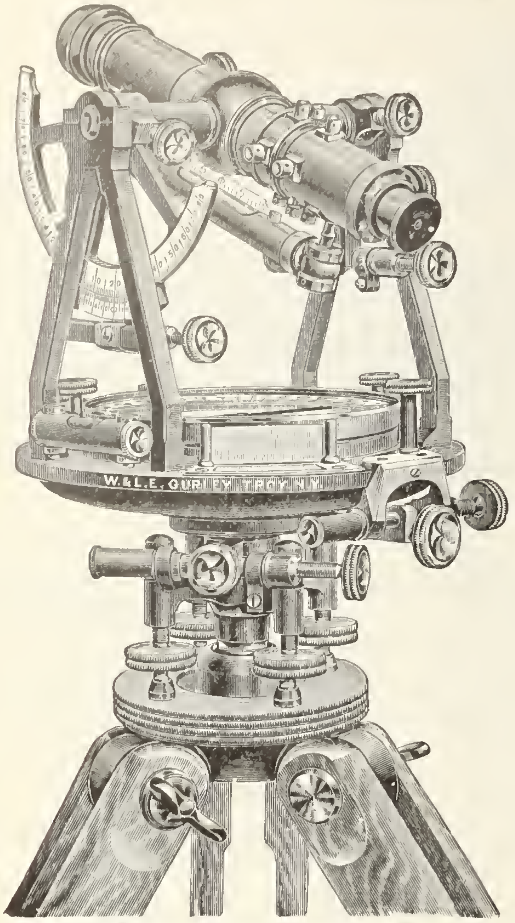
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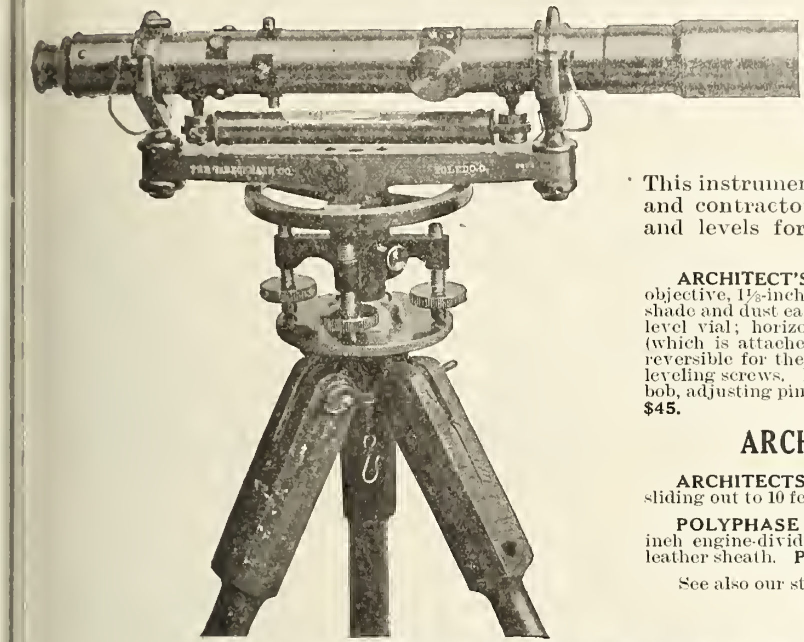

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No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

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	Star.	D.D.
10 to 25 united inches........	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 '	...	17.50
96 to 100 "	...	20.50
01 to 105 "	...	24.00
06 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.50	$ 6.75	$ 5.25
40 u. i.	4.25	3.75	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
00 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts —Single, 25 and 5 per cent. off; D. D., 40 and 0 per cent. off. Winnipeg prices are net.

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Floor Tile—Ceramic, any color, ¾-inch square, 1 inch hex., and 3-16-inch round, 55 cents per square foot up.

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Wall Tile—Rock faced, sizes 6x2 inch, 2x2 inch; colors, buff, grey, granite, red granite, 55 cents per square foot.

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Square head brass cocks, 65; iron, 65 per cent.

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Hot water boilers, 50 and 10 per cent.; hot water radiators, 50 and 10 per cent.; steam radiators, 50, 10 and 2½ per cent.; wall radiators, 50 and 10 per cent.; specials, such as angles, curves, etc., 25 per cent.

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30-gallon, standard, $4.50; extra heavy, $7.00.

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16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

(per 100 ft.)	Black		Galvanized
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.03	⅜ inch	2.86
½ inch	2.63	½ inch	3.48
¾ inch	3.05	¾ inch	4.28
1 inch	4.37	1 inch	6.02
1¼ inch	5.96	1¼ inch	8.21
1½ inch	7.16	1½ inch	9.86
2 inch	9.18	2 inch	12.78
2½ inch	16.10	2½ inch	21.85
3 inch	21.14	3 inch	28.69
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

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Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

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Burnt River rubble stone delivered, $15 to $16 per toise.

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Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

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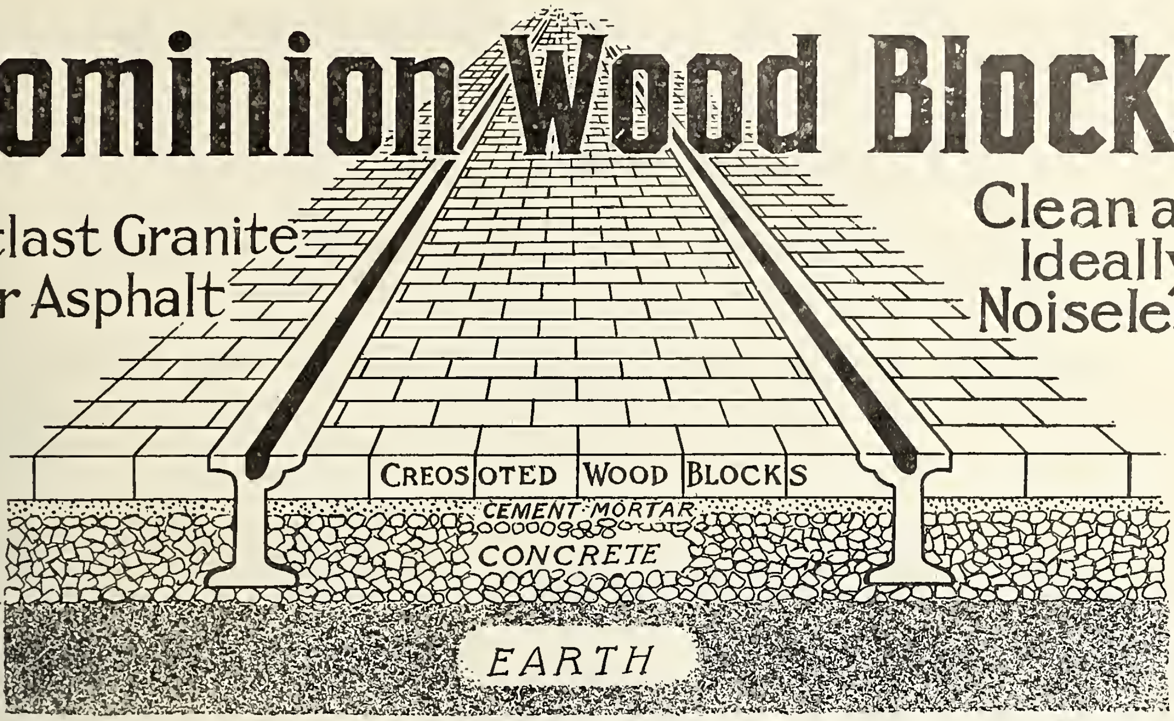

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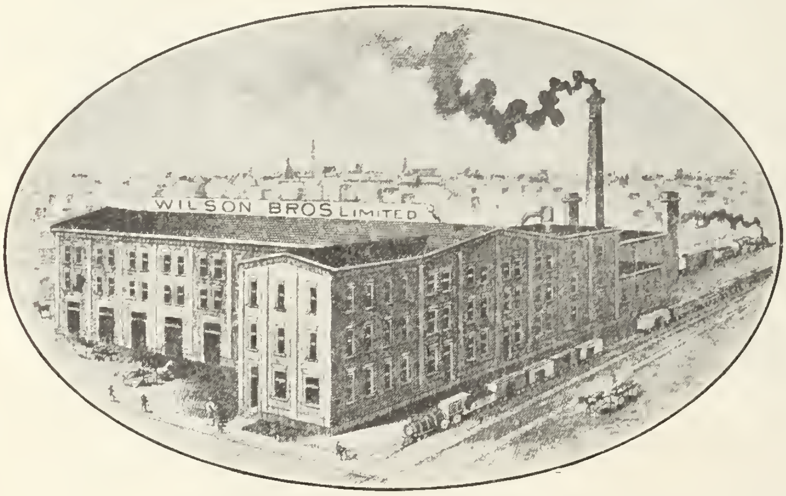

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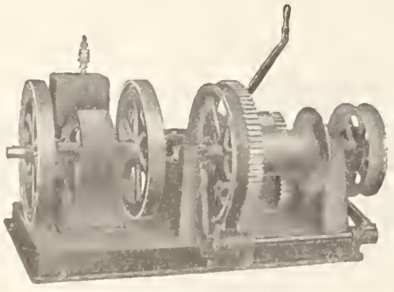

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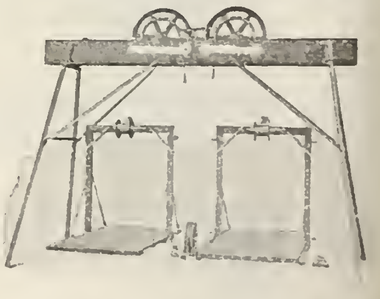

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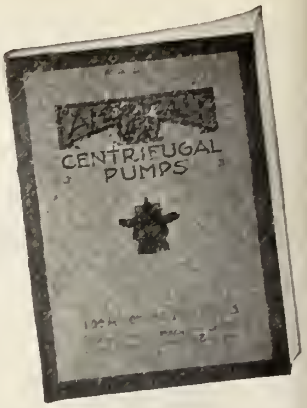

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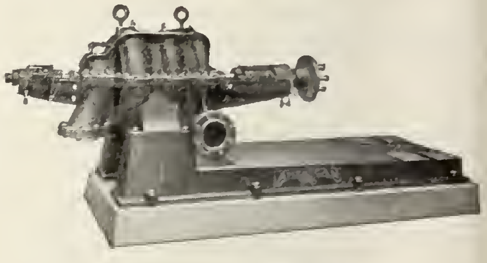
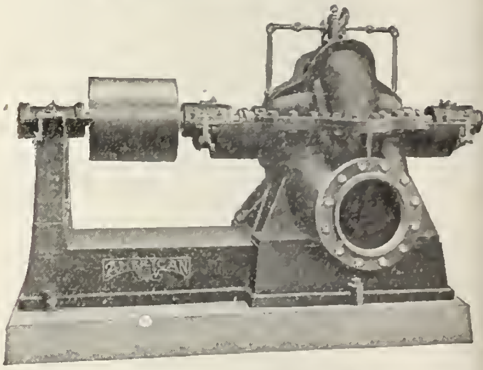
Instead of building a single type of centrifugal and recommending it for every purpose "American" centrifugals are built in over fifty distinct types and every size of every type is carefully tested in our own complete hydraulical laboratory and its efficiency proved before it is permitted to leave our works.

It must meet our standard of efficiency before it is allowed to leave our works and that is what is making the American trademark famous in pumping machinery.

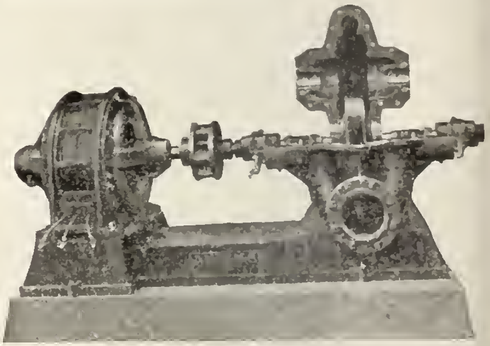


AMERICAN



"American" centrifugals attain up to 80 per cent. mechanical efficiencies and many of our specially designed pumps, installed according to our own specifications, show much higher efficiencies, enabling them to operate against high heads. We have many single stage centrifugals installed operating on over 200 feet heads.

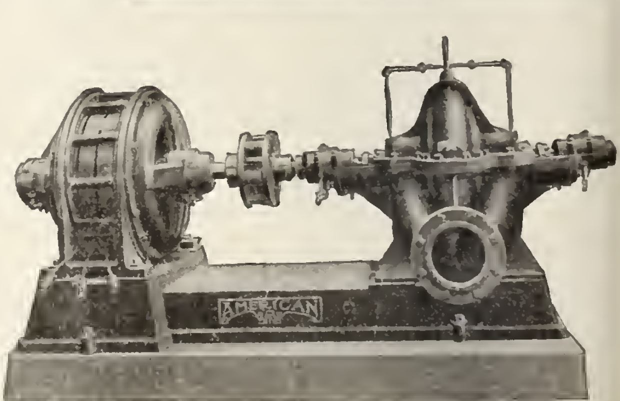
The low first cost of "American" centrifugals as compared with old style plunger pumps, combined with their high efficiencies, low cost for attendance and small cost for repairs make them **far more economical** than any other type of pump in nearly all conditions where **all costs are considered.**



Greatest economy in the end is the claim we make for "American" centrifugals and we are ready to prove that claim.

If you are interested in irrigation, write for our booklet, "Irrigation by Pumping" Bulletin No. 118.

Our General Centrifugal Pump Catalog No. 117 is the most complete ever issued. Write for it today.



The American Well Works

General Office and Works: Aurora, Ill., U. S. A.
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Canadian Sales Agency
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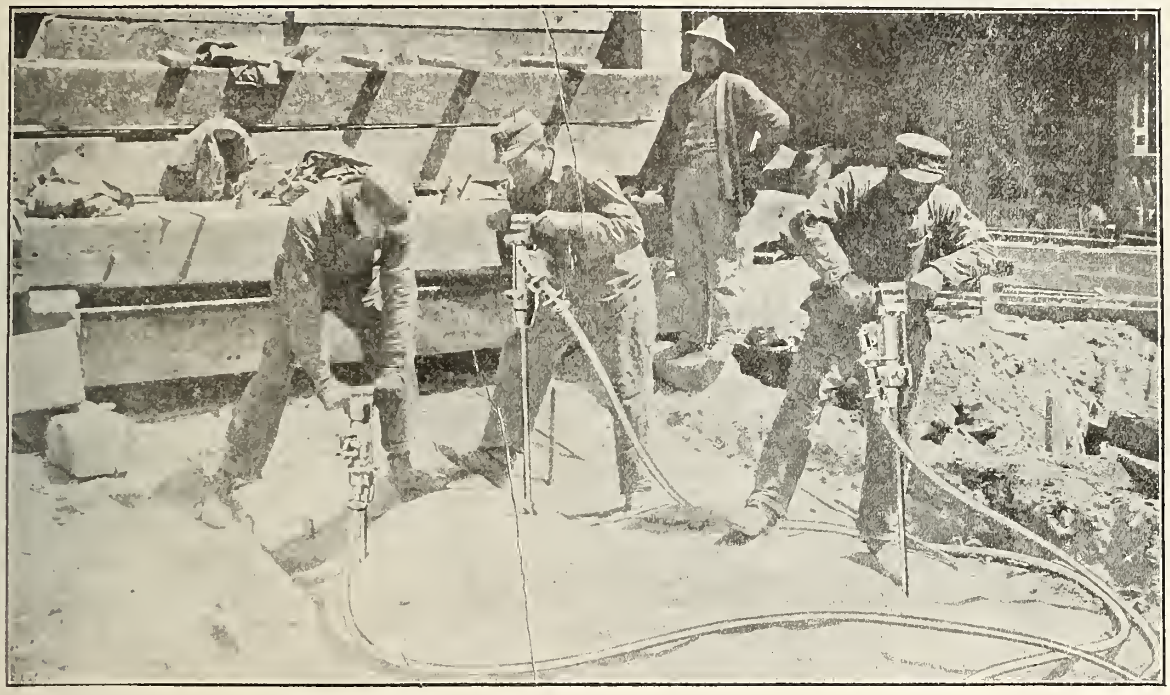
The McKiernan-Terry Class "B" Hammer Drill



"Three "Busy Bees" at work on the New York Subway Excavation"

Are you sinking a shaft?
Would you like to do it cheaper and faster?
If so, follow the method used by the contractors in New York, who are putting down the big shafts for the Subway Excavation.
They are using "24 McKiernan-Terry Class "B" Hammer Drills"
They call them "BUSY BEES."
These drills will put down 8 ft. holes, either *wet* or *dry*.
They will bore about twice as fast as the reciprocating rock drill.
They use half as much air.
They require no setting up.
There is no time wasted.
They are BUSY all the time.
They are the last word in a shaft sinking tool.
BUY ONE AND TRY IT.

Canada Foundry Company, Limited

Cor. King and Simcoe Sts., TORONTO

District Offices:
Montreal, Halifax, Ottawa, Cobalt, Winnipeg, Calgary, Nelson, Vancouver, Prince Rupert

Charles Street, Stratford, Ontario, showing "Tarvia Modern Pavement"

Stratford's Experience with Tarvia

STRATFORD, Ontario, did some thorough and successful work with Tarvia X in 1910 and the accompanying photograph shows a section of Charles Street in that city built by the Tarvia Modern Pavement method.

Tarvia X was used as a binder throughout the road on a Telford base. Although the job was done by the somewhat primitive barrel-and-kettle method, the total cost was only $1.32 per yard.

The Tarvia, filling the voids of the stone, acts as a plastic matrix, keeping the stone in position, preventing all internal movement, resisting water and frost, protecting the road against automobile traffic and preventing the formation of dust.

After its first year of use, the street is in excellent condition and is giving perfect satisfaction. It has been visited by various engineers, all of whom agree as to the success of the work.

This is only one of thousands of instances of successful Tarvia construction.

We will be glad to send any enquirer a booklet showing many other cases.

The Paterson Manufacturing Co. Limited, Montreal, Toronto Winnipeg Vancouver
The Carritte-Paterson Manufacturing Co., Limited, St. John, N.B. Halifax, N.S.

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beg to announce that they have acquired
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The new company will continue to operate in Montreal without change in management and solicits a continuance of your patronage.

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For Every Purpose

We carry a complete stock of "Kilbourne & Jacobs" Barrows, suitable for every requirement. These barrows will out-wear any other make and once you install "K and J" Barrows on your work you will use no other make. They cost no more and when you purchase barrows—you might just as well get the very best. We have a special Barrow Catalogue, which illustrates and describes fully every imaginable style of wheelbarrow—we want you to have a copy—it will surely come in useful—perhaps not now at the moment—but some day.

If you need barrows for your present work—tell us your requirements—we may be able to suggest a type of barrow which will be just what you always wished for. We have so many different styles—Barrows for

Concrete Stone Sand Earth Ashes
Mortar Brick Sawdust Coal
Coke Metals, Etc., Etc.

Drop Us a Line for Copy of Catalog 30

F. H. Hopkins & Co.
MONTREAL

BRANCH OFFICES: General Supply Company of Canada, Ltd., Winnipeg Agents
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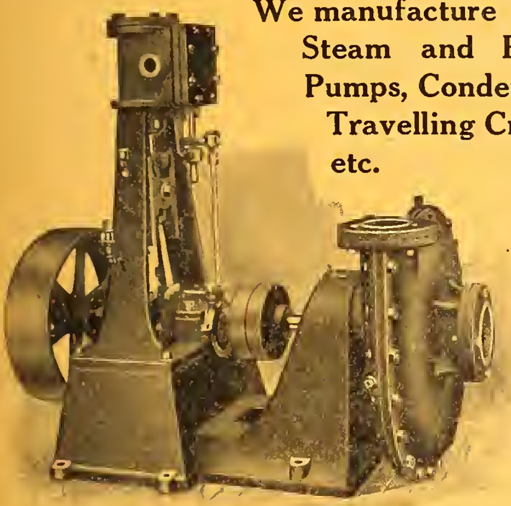
ESTABLISHED 1886

Contract Record and Engineering Review



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is based on a machine's
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not on its
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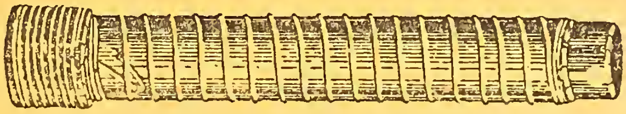

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RESERVOIR TANKS

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and better.

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Full Particulars and Estimates Furnished

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Horizontal Tubular Boilers

Built for any Working Pressure Desired

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Also Vertical and Locomotive Types.

Price on Application

Write our Nearest Sales Office.

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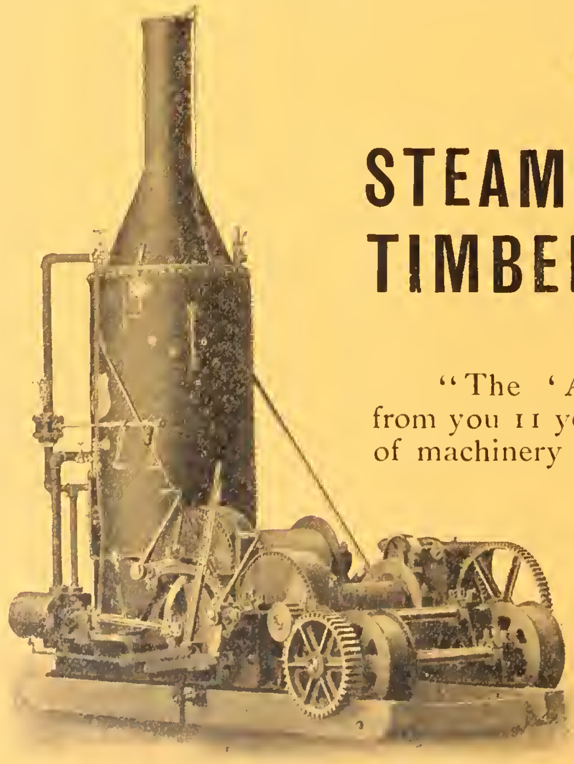

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STEAM AND ELECTRIC HOISTS TIMBER AND STEEL DERRICKS

OF ALL CAPACITIES

"The 'AMERICAN' Derrick Engine purchased from you 11 years ago has been the most satisfactory piece of machinery I have ever owned.

"It has been in constant daily use with less than 10 dollars' worth of repairs
"W. G. LARUE, Duluth, Minn."

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Please send prices and information on
"AMERICAN" whether Engines, Derricks, etc.

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St. Paul, Minn.
C.R.

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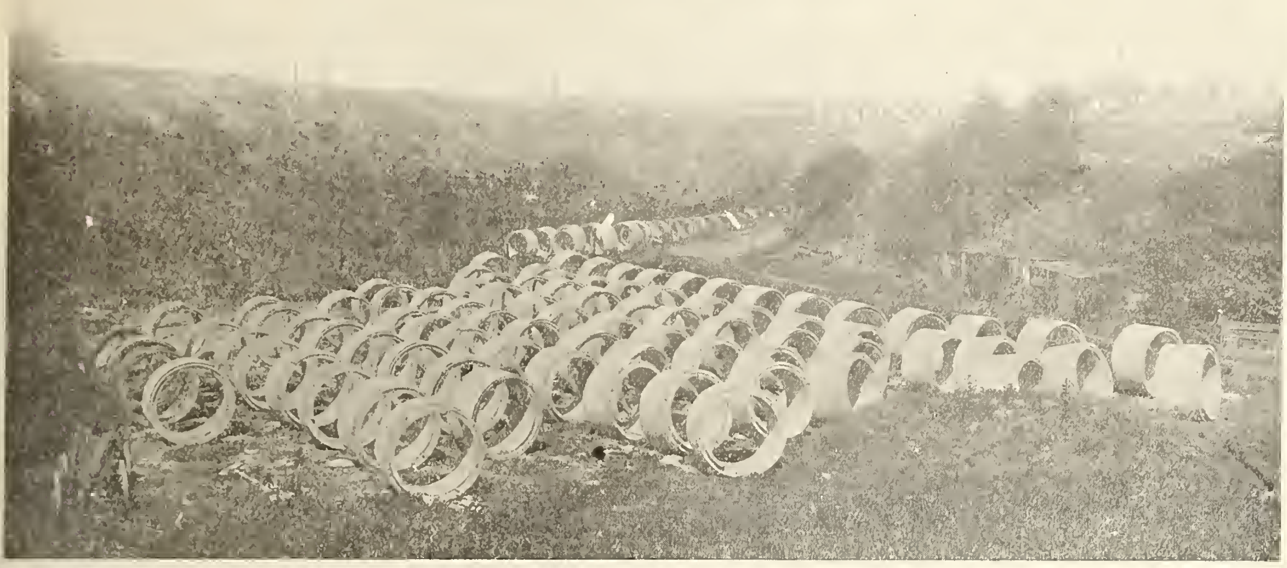

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If It Passes Our Tests, It Will Meet Your Needs

There is no longer any question about the suitability of concrete for the making of sewer pipes, drains or any work that has to withstand the corrosive effects of acids or the damages inflicted by frost and water.

Reinforced concrete, **properly made,** has been successful in the most rigid tests and is now the recognized material for all important work.

Properly made concrete, means, not only thoroughly mixed and the right proportions of cement, aggregate and sand—it also means that the cement used, be of the highest standard of purity.

The pipes shown here were made in Hamilton, Ont., by the REINFORCED CONCRETE PIPE CO. of JACKSON, MICH. They have made pipes for some of the most important work done, both in the United States and Canada and they now use "Canada" Cement exclusively.

THE REINFORCED CONCRETE PIPE CO., report that although they have, on one piece of work, used cement from no less than five of our mills, they could see no difference in the quality of the cement or in the work produced. That is what the "Canada" Brand stands for:–absolute purity and absolute uniformity.

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Various Sizes with Latest Equipments.

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Cobalt, opp. Right of Way Mine.

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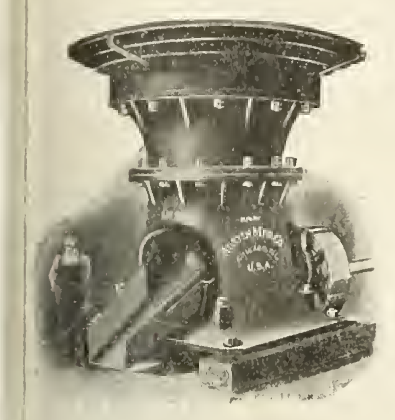

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Complete Quarry Plants Designed and Erected

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(Continued on page 12)

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Residence of Mr. J. C. Eaton, Toronto. **Messrs. Wickson & Gregg, Architects**

Don Valley Porous Terra Cotta Fire Proofing, Foundation Bricks, Facing Bricks and Enameled Bricks Exclusively Were Used in This Structure

¶ These bricks have been the unanimous choice of discriminating architects and owners in competition with samples submitted by the leading brick firms of Canada and the United States. They are the only thoroughly vitrified facing bricks ever manufactured in the Dominion, and the most exclusive high-class pressed brick on the American continent.

¶ The above view is an illustration of one of the many important buildings in which this product is used.

THE DON VALLEY BRICK WORKS

Head Office: 36 Toronto St., TORONTO

Montreal Agent: **David McGill, 83 Bleury Street**

Most Mixing Least Fixing

The M-C Line of CONCRETE MIXERS

have exclusive power saving, time saving, repairs eliminating and money-in-your-pocket details which are found on no other mixer.

Investigate! 'Twill only cost you postage to get the catalog.

The Ford Iron Company, Limited

Montreal

Details
DO
Make a
difference
to you.

M-C Rail Track Mixer with Batch Hopper and Motor

Details
DO
Make a
difference
to you.

THE Rogers organization endeavors to make a *superior* and *even setting* Portland Cement of *High Quality* and absolutely *constant* character from run to run, as produced at their mills. This care results in *strong bonding*, and *highly satisfactory* workmanship. It *helps* the engineer and contractor, and brings *special profit* to the erecting contractor to use concretes from Portland Cements, Rogers Brands. Rogers Cement is *notably easy* to handle in concretes with *large* proportions of aggregates—*avoiding* the troubles of indeterminate and delayed setting, giving *excellent* bonding, and showing a margin of *extra* strength due to their *high* quality in *composition* and *fineness of grinding*.

Rogers *Service* embraces emergency reserve stock adjacent to principal centres, *prompt* delivery etc., which contribute to *absolute satisfaction* of engineer, architect, contractor and owner alike. Specify Rogers Cement.

ROGERS' CEMENT

Mills are located at

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and Wiarton.

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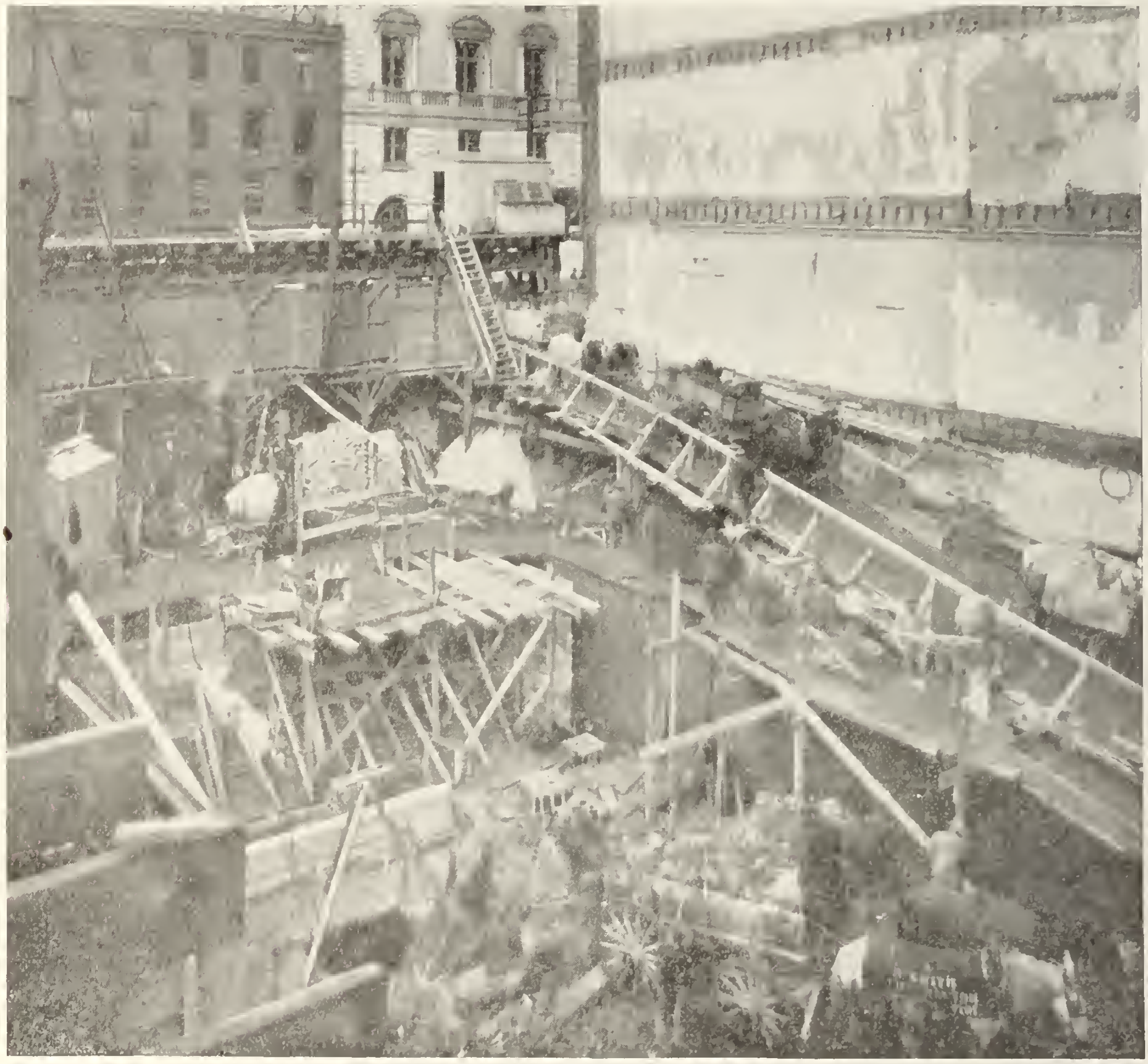
1

Wettlaufer Heart-Shaped Mixers

at work on the largest building in the British Empire



C. P. R. Building, Toronto, George H. Fuller & Co., Contractors

Wettlaufer Heart Shaped Mixers are more generally used by large building and engineering contractors, not only because they will do as much work as the largest mixers made, but because they are light and compact and can be operated in the difficult places. They are the simplest, strongest mixers made and can be run with one to two less men than other mixers.

Contractors should learn all about the improvements in our new 1912 machines

WETTLAUFER BROS.

Head Office and Warerooms

178 Spadina Avenue ∴ ∴ TORONTO

BRANCH OFFICES:
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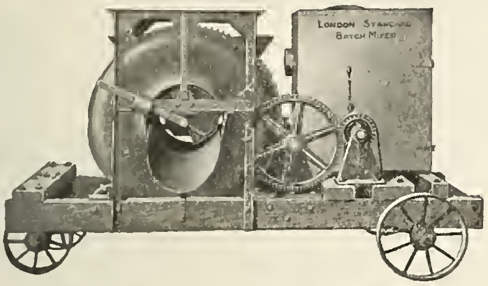
London Standard Batch Mixers



London Standard Drum Batch Mixer No. 1
Equipped with Gasoline Engine

The London Standard Drum Batch Mixers are made in four sizes, namely, one-third yard, one-half yard and one yard batches and are furnished with any equipment.

The many new and improved features of the London Standard Drum Batch Mixers appeal to every contractor desiring a mixer of this type. **We can give you the best value for your money** of any firm doing business, **because** we manufacture only Concrete Machinery, and on this account we can sell you a machine at very much less cost than Firms who do not manufacture their own machines but handle a concrete mixer along with other lines of goods.

We also manufacture—

Face-Down Block Machines
Cement Brick Machines
Power Cement Drain Tile Machines
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Sewer Pipe Molds
Ornamental Molds
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Adjustable Sill, Step and Window
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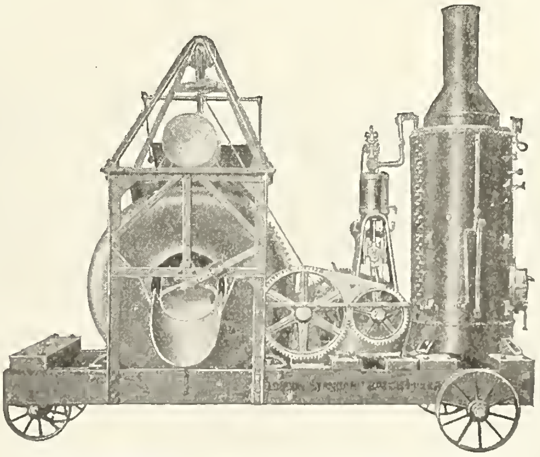
And a full line of
Cement Working Tools



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with Steam Engine and Loading Skip

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CLASSIFIED INDEX TO ADVERTISEMENTS—Continued

(Continued from page 6)

Pumps and Pumping Machinery
McDougall Caledonian Iron Wks
Mussens Limited
Ontario Wind Eng. & Pump Co.
Smart-Turner Machine Co.
Waterous Engine Works Co.

Quarry Machinery
Johnston & Chapman
George Anderson & Co.

Railway Supplies
Ford Iron Co.
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Reinforcements, Concrete & Steel
Ambursen Hydraulic Cons. Co.
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Factory Products
Ford Iron Co.
Greening Wire Co., B.
Leach Contracting Co.
Page Wire Fence Co.
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Steel & Radiation
Turner, C. A. P.

Revolving Stone Screens
Greening Wire Co., B.
Johnson & Chapman Company

Road Machinery
Erie Machine Co.
Ford Iron Co.
Hamilton Machinery Co.
Morrison & Co., T. A.
Mussens Limited
Western Wheeled Scraper Co.
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Roofing Materials
Canadian Supply Company
Galt Art Metal Co.
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Noble, Clarence W.
Paterson Mfg. Co.
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Taylor, J. & J.

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Rogers Supply Co.
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Greening Wire Mfg. Co., B.
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Sewer Pipe
Britnell & Co.
Canada Iron Corporation
Dominion Sewer Pipe Co.
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Ontario Sewer Pipe Co.
Ontario Lime Association
Standard Drain Pipe Co.

Shovels (Steam)
Browning Engineering Co.
Beatty & Sons, M.
Canada Foundry Co.
Ford Iron Co.
Hopkins & Co., F. H.
Montreal Locomotive Works
Mussens Limited
Willis Shaw Mach. Co.

Smoke Stacks
Des Moines Bridge Co.

Steam Apparatus
Sturtevant Co., B. F.

Steel Bars
Factory Products
Steel Co. of Canada

Steel Shingles and Ceilings
Galt Art Metal Co.

Stone
Britnell & Co.
Brodie, Jas.
Christie, Henderson & Co.
Consolidated Stone Co.
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Corinthian Stone Co.
Crushed Stone, Limited
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Steel Co. of Canada
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Sarnia Bridge Co.
Steel & Radiation

Submarine Diver
Rouleau, Joseph N.

Tanks and Stand Pipes
Berg Machinery Co.
Des Moines Bridge Co.
Inglis, John
Jenckes Machine Co.
Marsh & Henthorn
McDougall Caledonion Iron Wks
Ontario Wind Eng. & Pump Co.

Technical Journals
Ainsworth & Sons, Wm.

Tents
Woods Limited

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Hunt & Co., Robt. W.

Valves
Canada Iron Corporation
Gartshore-Thomson Pipe Co.
Kerr Engine Co.

Ventilating & Heating Apparatus
Sturtevant Co., B. F.

Veterinary Remedies
Johnson, A. H.

Water Softeners and Filters
American Water Softener
Berg Machinery Co.

Water Turbines
Canadian Boving Co.
Escher Wyss & Co.

Water Wheels
Canadian Boving Co.
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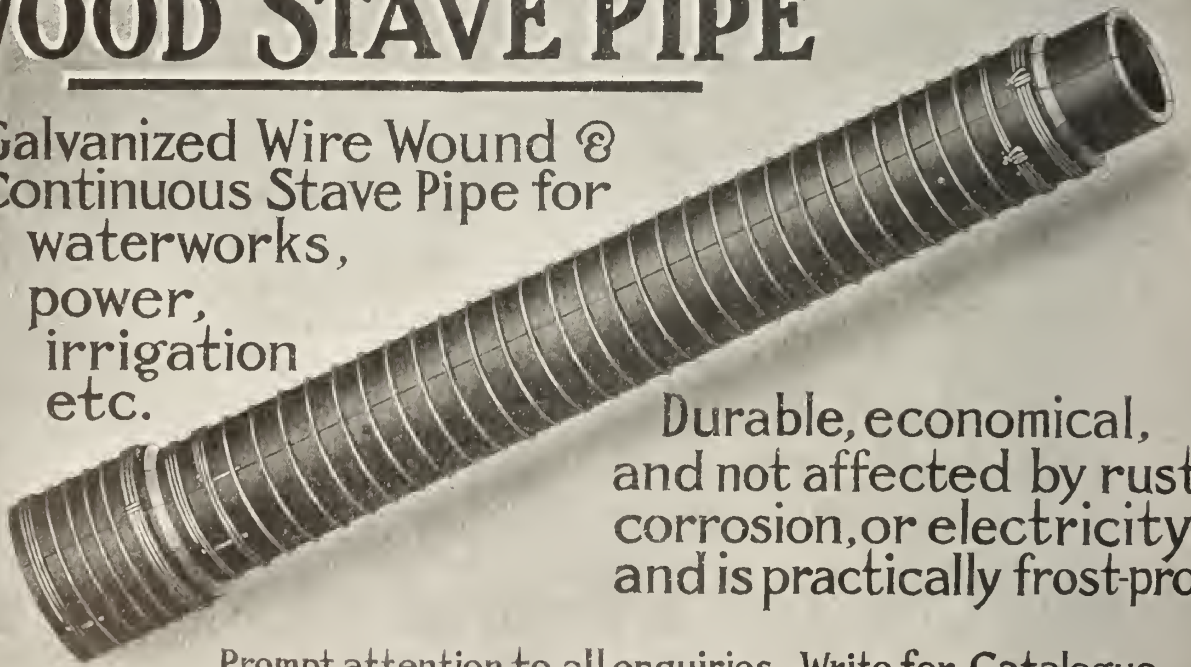

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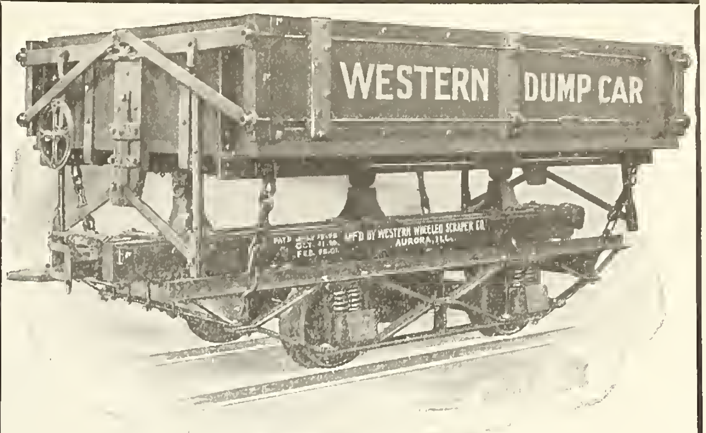

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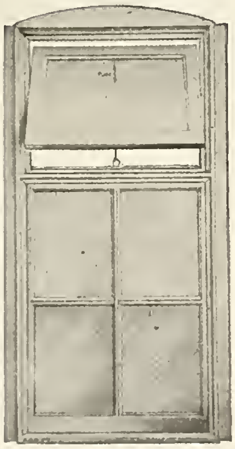

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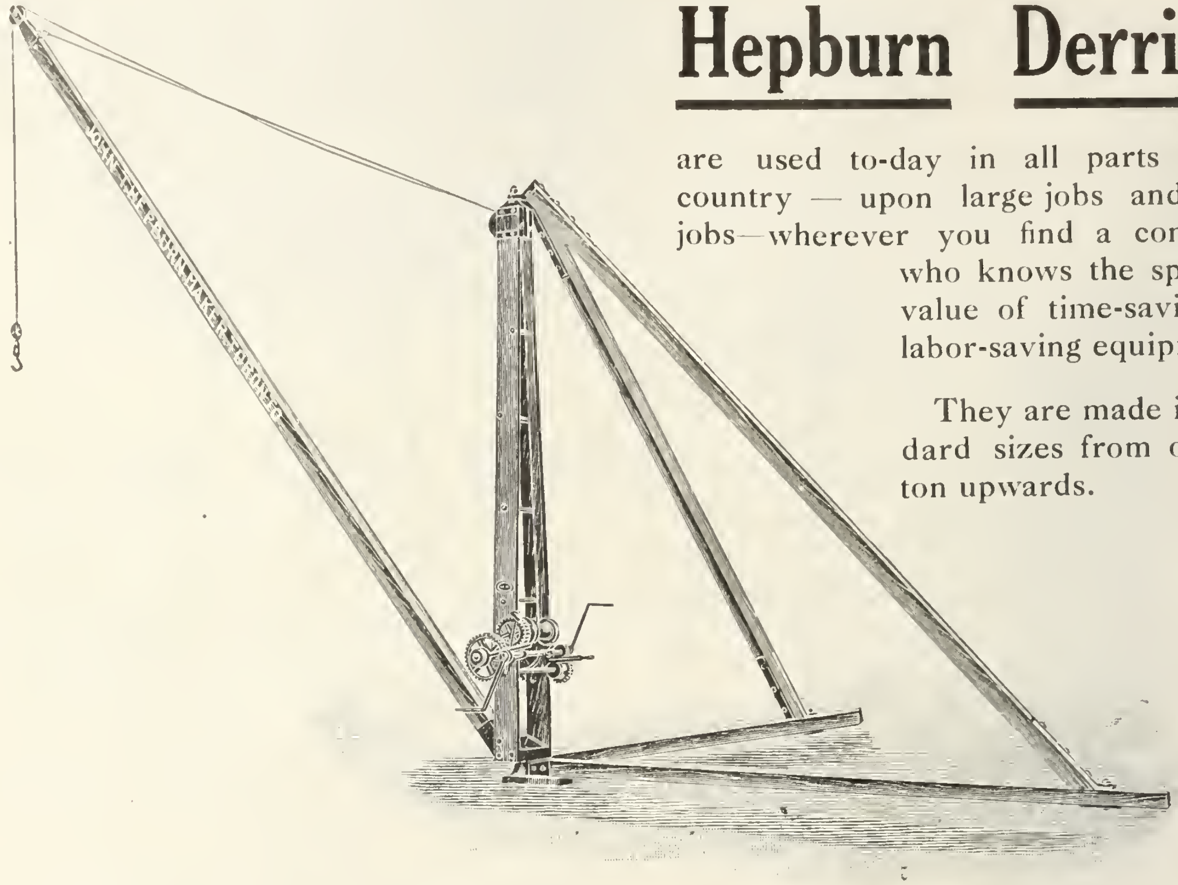
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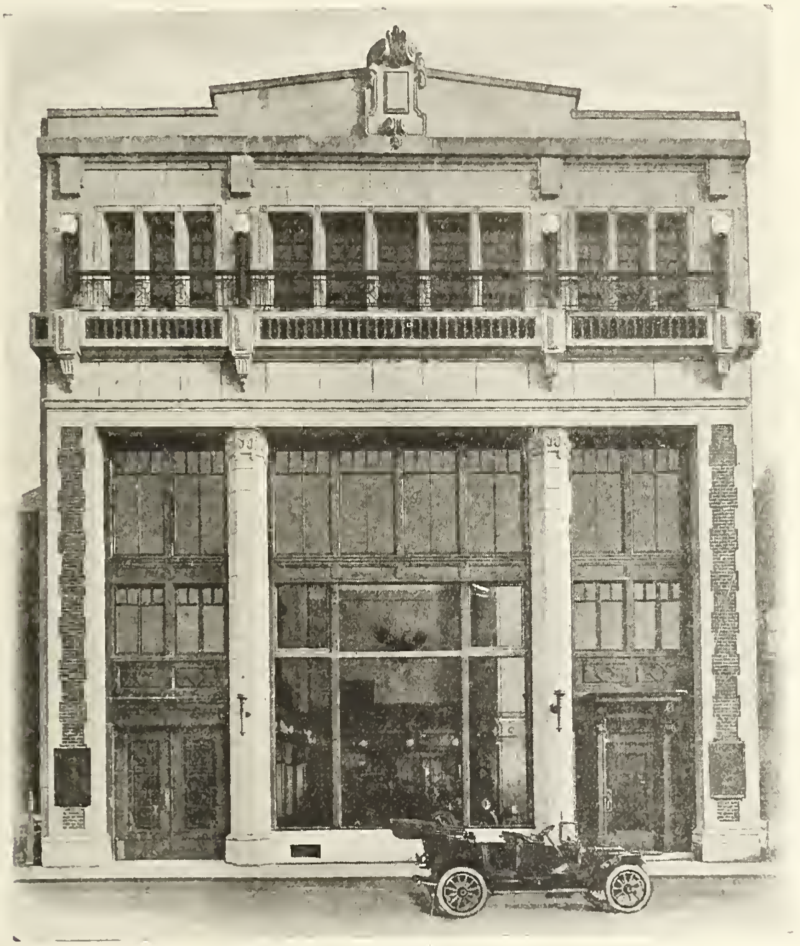

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ALPHABETICAL LIST OF ADVERTISERS

Abenaque Machine Works	80
Acme Equipment & Engineering Co.	74
Ainsworth & Sons, Wm.	25
Albert Manufacturing Co.	77
Alsen's American Portland Cement Wks.	78
Ambursen Hydraulic Construction Co. of Canada, Limited	
American Enameled Brick & Tile Co.	82
American Hoist & Derrick Co.	2
American Water Softener Co.	
American Spiral Pipe Works	79
American Well Works	
Anderson & Co., 1905 Ltd. George	22
Andresen, H. P.	32
Bain & Ross	92
Bates & Edmonds Motor Co.	94
Batts Limited	
Beatty & Sons Limited, M.	79
Beckman Co., L.	
Bell Filtration Co. of Canada, Ltd.	31
Bennett, Robert	79
Berg Manufacturing Company	
Blystone Manufacturing Company	81
Bowman & Connor	92
Bremner Limited, Alex.	91
Britnell & Co., Ltd.	86
Brodie & Company, James	
Brown Hoisting Machinery Co.	83
Browning Engineering Company	83
Buffalo Meter Co.	27
Business Systems Limited	75
Bryan Manufacturing Company	84
Canada Cement Co., Ltd.	3
Canada Foundry Co., Ltd.	20-71-97
Canada Iron Corporation Limited	91
Canada Steel Co.	80
Canada Wire & Cable Co.	94
Canada Wire & Iron Goods Co.	32
Canadian Boving Company	30
Canadian Bridge Co., Ltd.	88
Canadian Fairbanks-Morse Co., Ltd.	22
Canadian Kellogg Co.	
Canadian Office and School Furniture Company, Limited	
Canadian Norcross Bros. Co.	18
Canadian Pipe Co., Ltd.	90
Canadian Rand Co., Ltd.	1
Canadian Supply Company	29
Carey Mfg. Co., Philip	
Cement Era Pubsishing Co.	72
Ceresit Waterproofing Company	99
Chipman & Power	92
Christie Henderson & Co.	86
Cleveland Bridge & Engineering Co., Ltd.	88
Cloisonne Glass Co. of Canada	
Cook, A. D.	
Commercial, The	87
Conduits Company, Limited	91
Consolidated Glass Company	
Consolidated Optical Co., Ltd.	
Consolidated Stone Co.	
Consumers' Gas Company	
Contractors' Supply Co., Ltd.	86
Crushed Stone Limited	75
Corinthian Stone Co.	24
Dahlstrom Metallic Door Co.	
Dennis Wire & Iron Works Co., Ltd.	90
Des Moines Bridge & Iron Co.	79
Dickson Bridge Works Co., Ltd.	
Doolittle & Wilcox Limited	91
Dominion Bridge Co., Limited	88
Dominion Creosoting Company	
Dominion Marble Co., Ltd.	21
Dominion Sewer Pipe Co., Ltd.	21
Dominion Wood Pipe Co., Limited	12
Don Valley Brick Works	7
Down Draft Furnace Company	34
Eadie-Douglas Limited	36
East Iron & Machine Co.	78
Eastern Pipe & Construction Co., Ltd.	34
Eaton & Co., T.	
Eaton & Sons, Ltd., J. R.	82
Erie Machine Shops	87
Factory Products Limited	35
Farmer, John T.	92
Ferguson, H. S.	92
Ford Iron Company, Limited	8
Foundation Company	93
Fuce, Edward O.	92
Galt Art Metal Co., Limited	
Galt Engineering Co., John	92
Gartshore, John J.	92
Gartshore-Thompson Pipe & Foundry Co., Ltd.	90
General Machinery Co., Ltd.	88
Georgian Bay Shook Mills, Ltd.	94
Gibb, Alexander	
Goodyear Tire & Rubber Co. of Canada, Ltd.	33
Greening Wire Co., Ltd., B.	
Guarantee Company of North America	92
Gurley, W. & L. E.	84
Hagerville Contracting Co., Ltd.	13
Hamilton Pressed Brick Co.	23
Hamilton Machinery Co., Ltd.	26
Hancock, Jr., H. Syd.	92
Harvey, J.	87
H. & E. Lifting Jack Co.	74
Heinicke Inc., H. R.	32
Hepburn, John T.	14
Hobbs Manufacturing Co., Ltd.	76
Holmes & Sons, Fred	79
Hopkins & Company, F. H.	100
Hunt & Company, Robert W.	92
Hunter Bridge & Boiler Co., Ltd.	89
Imperial Wire & Cable Co., Ltd.	92
Inglis Company, John	69
International Marine Signal Co., Ltd.	17
Jamieson Lime Company	85
Jenckes Machine Company, Ltd.	2
Johnston, A. H.	
Johnston & Chapman Company	
Kennedy, James C.	92
Kerr Engine Co., Ltd.	
Laurentian Granite Co., Ltd.	92
Lea, R. S.	92
Leach Concrete Company	72
Leonard & Sons, E.	75
Leslie & Co., Ltd., A. C.	
London Concrete Machinery Co., Ltd.	11
London Gas Power Co., Ltd.	73
Luxfer Prism Company	
Mace, T. Harry	92
MacKinnon Holmes & Co., Ltd.	76
MacLean Daily Reports	81
Marsh & Henthorn Limited	73
McCoy Company, Henry J.	25
McDougall Caledonian Iron Wks. Co., John	71
McIlwraith, James A.	92
McMillan & Sons, W. N.	81
McNally & Co., William	89
Meadows, George B.	35
Metal Shingle & Siding Co.	95
Metallic Roofing Co., Ltd.	73
Metropolitan Paving Bricks Co.	32
Miller & Co., George M.	
Milton Pressed Brick Company	
Mitchell, Chas. H. & Percival H.	92
Mitchell Company, Ltd., Robert	72
Mississquoi Marble Co., Ltd.	82
Montreal Locomotive Works, Ltd.	75
Morrison & Co., T. A.	92
Munderloh & Co., Ltd.	13
Mussens Limited	4
Myers, Oakley	75
National Bridge Co., of Canada, Ltd.	89
National Iron Works Ltd.	91
Neptune Meter Co.	27
Noble, Clarence W.	78
Northwestern Terra Cotta Company	83
Ontario Asphalt Block Co., Limited	78
Ontario Lime Association Limited	77
Ontario Sewer Pipe Co., Ltd.	20
Ontario Wind Engine & Pump Co., Ltd.	75
Ormsby, Ltd., A. E.	13
Owen Bucket Co.	80
Pacific Coast Pipe Co., Ltd.	1
Page Wire Fence Co., Ltd.	
Patterson Manufacturing Co.	
Pedlar People Limited	98
Phoenix Bridge & Iron Works, Limited	89
Port Credit Brick Co., Ltd.	90
Power & Son	
"Prime White" Road Oil Co.	
Pyle-National Electric Headlight Co.	19
Queenstown Quarry Co., Ltd.	91
Reid & Brown	92
Rhodes, Curry Company, Limited	73
"R. I. W." Damp Resisting Paint Co.	19
Rogers Limited, Alfred	9
Rogers Supply Company	25
Roman Stone Co., Limited	15
Rouleau, Jos. N.	92
Sackville Freestone Co., Ltd.	17
Sand & Supplies, Ltd	89
Sarnia Bridge Co., Ltd.	89
Shawmut Vitrified Paving Brick Works	
Sheppard & Sons, Jas.	72
Smart-Turner Machine Co., Ltd.	1
Smith Limited, Thos. & Wm.	96
Smyth & Ryan	86
Standard Drain Pipe Co., Ltd.	21
Standard Foundry & Machine Co.	35
Standard Ideal Co., Ltd.	36
Steel Company of Canada	30
Steel & Radiation, Ltd.	28
Steward, A. P.	74
Stinson-Reeb Builders' Supply Co.	
Sturtevant, B. F.	32
Taylor, J. & J.	
Taylor, Hogle & Davis	87
Tide Water Iron Works	77
Thew Automatic Shovel Co., The	74
Thompson & Co., B. & S. H.	21
Toronto Furnare & Crematory Co.	76
Toronto Plate Glass Importing Co., Ltd.	1-83
Troy Wagon Works Co.	82
Turner, C. A. P.	
Union Water Meter Co.	27
Universal Crusher Co.	80
Vining Manufacturing Co.	
Vulcan Iron Works	82
Wadsworth Howland & Co., Inc.	79
Waterous Engine Works Co., Ltd.	77
Watson Wagon Company	85
Weeks, Arthur L.	92
Wells & Gray, Ltd.	34
Western Canada Contractor	86
Western Wheeled Scraper Co.	13
Wettlaufer Bros.	10
Whitehead & Co., Ltd., John	
Wilson Bros., Ltd.	
Woods Limited	27
Wyss & Co., Escher	95
York Sand & Gravel Co.	86

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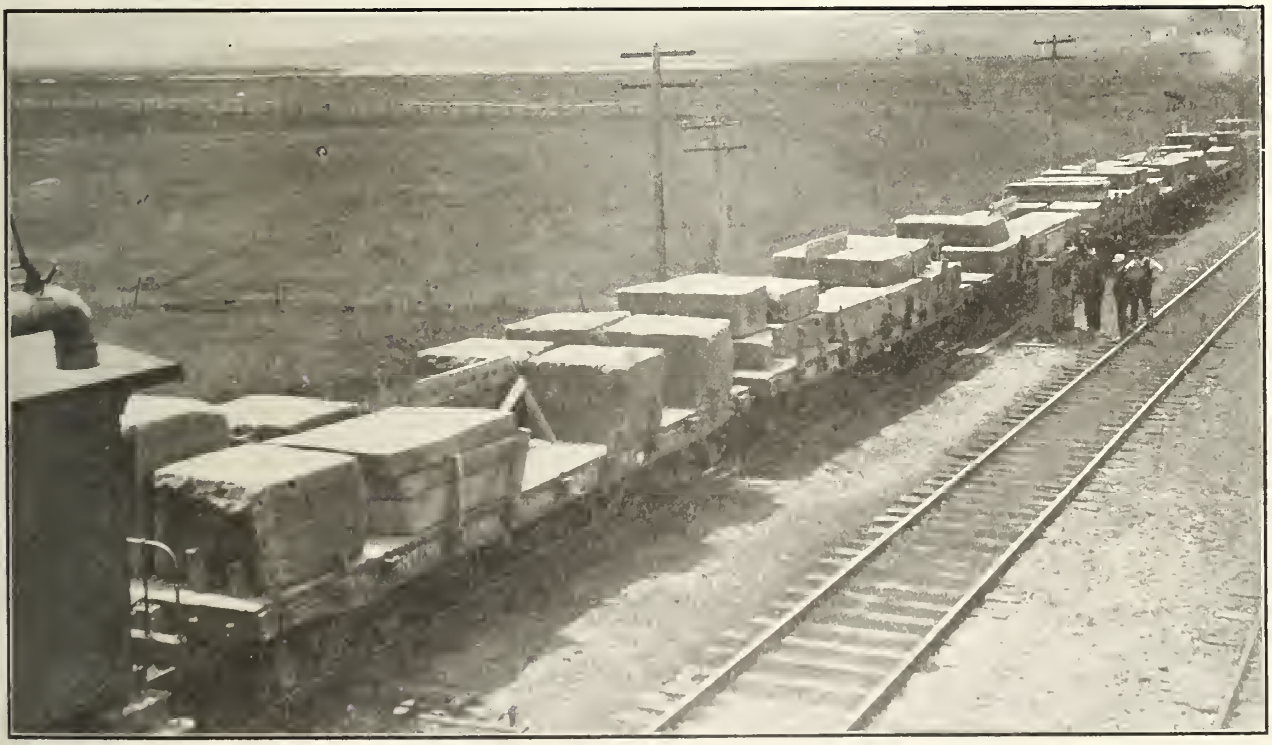

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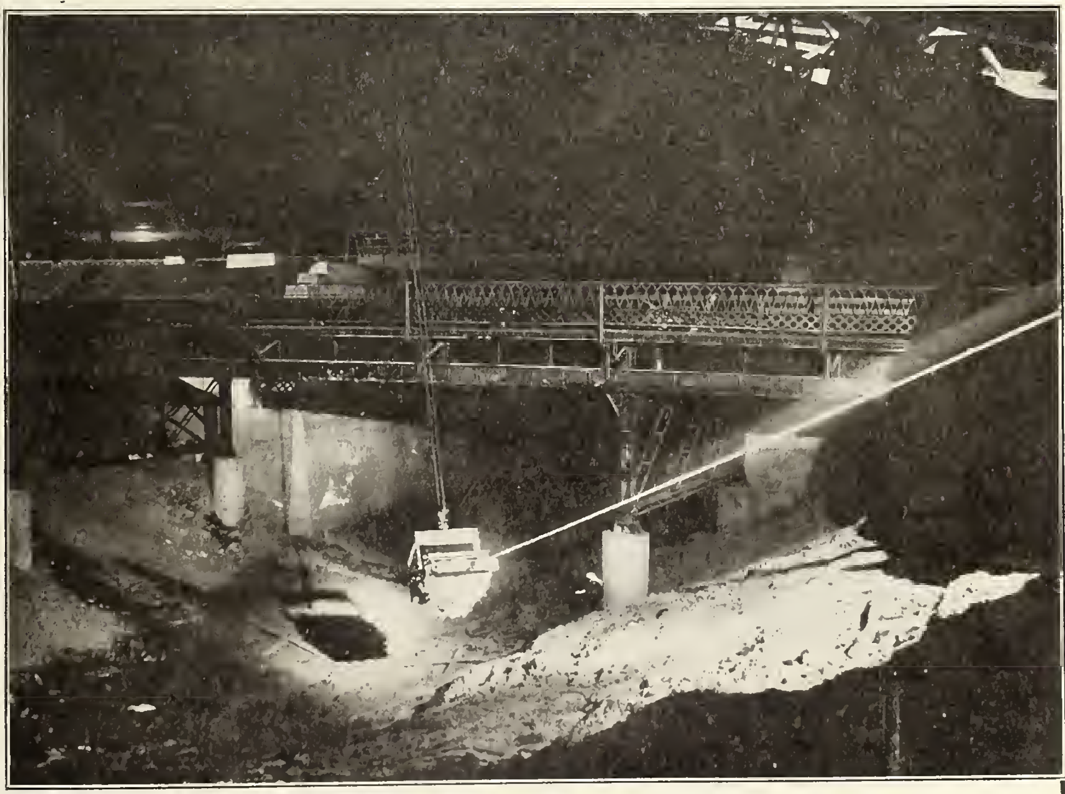

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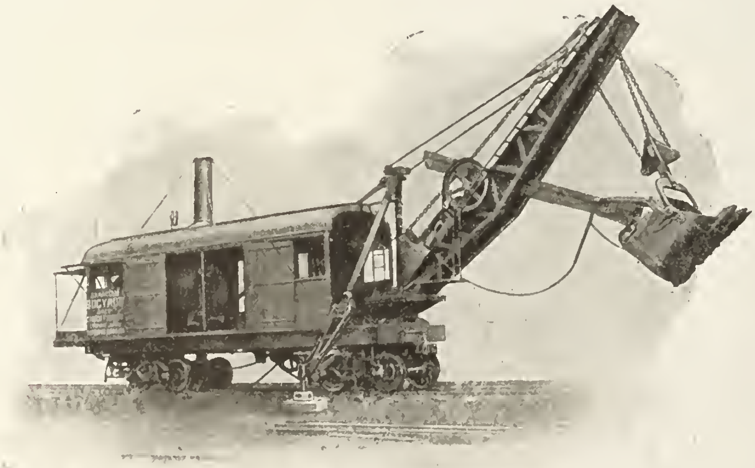

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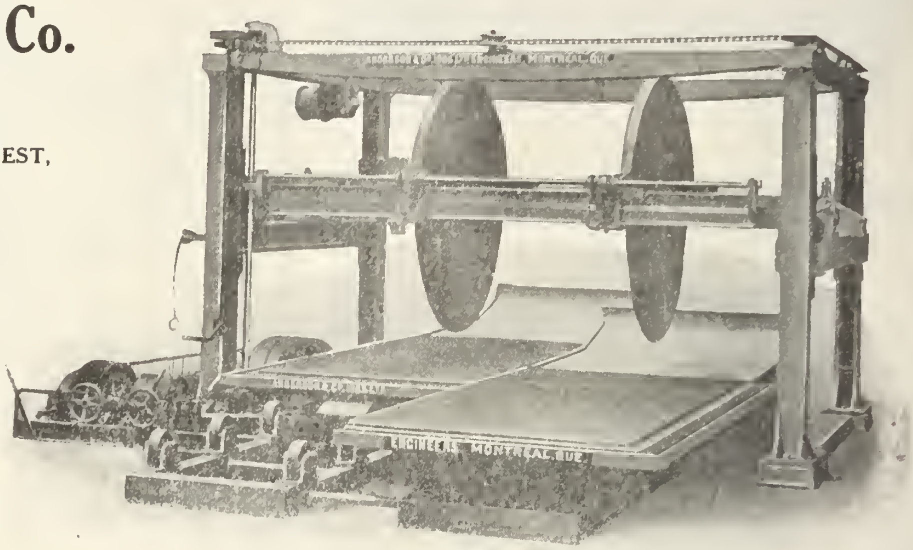

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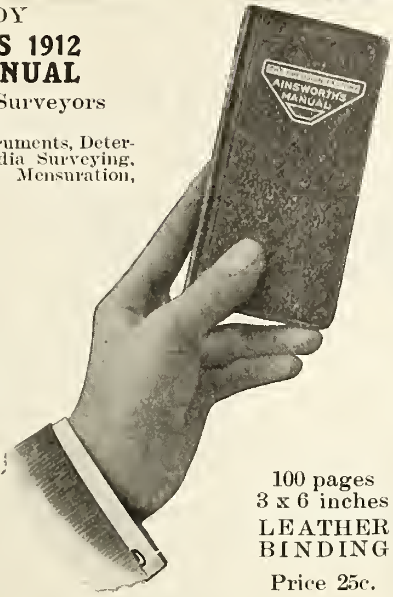

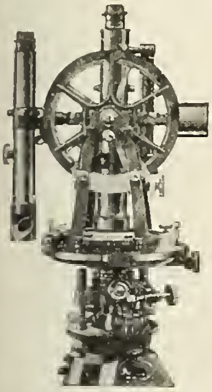

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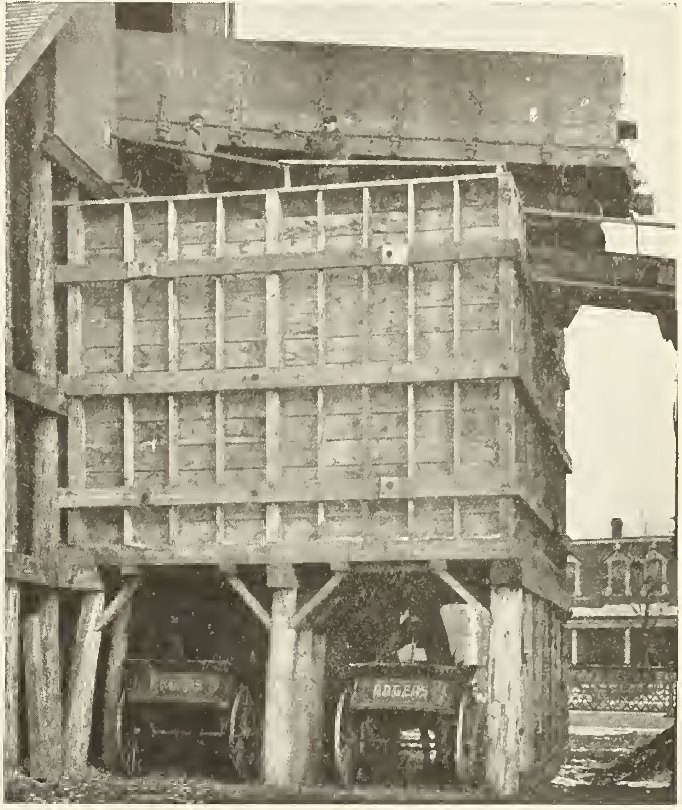

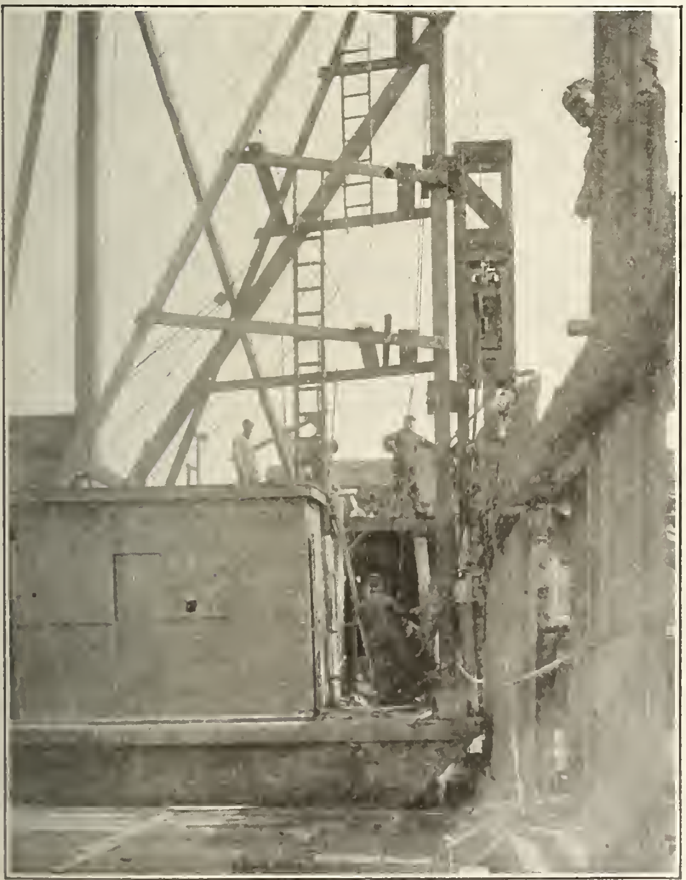

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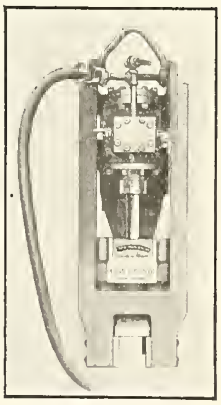

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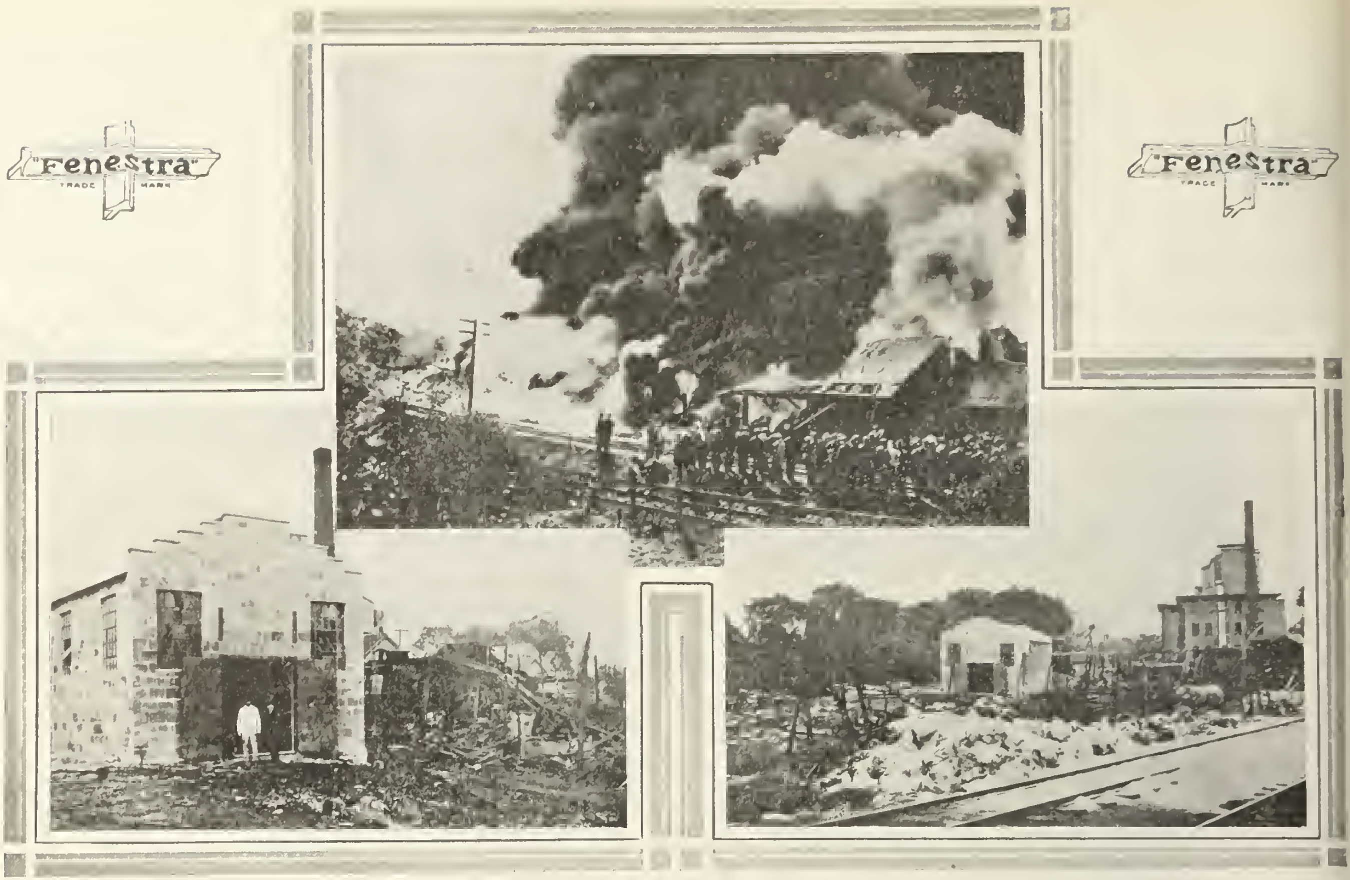

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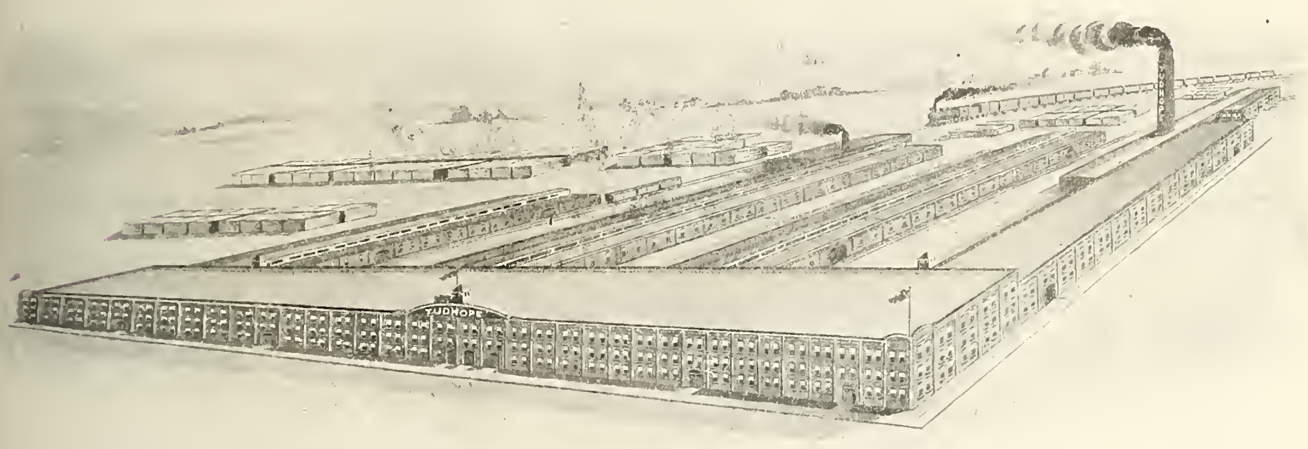

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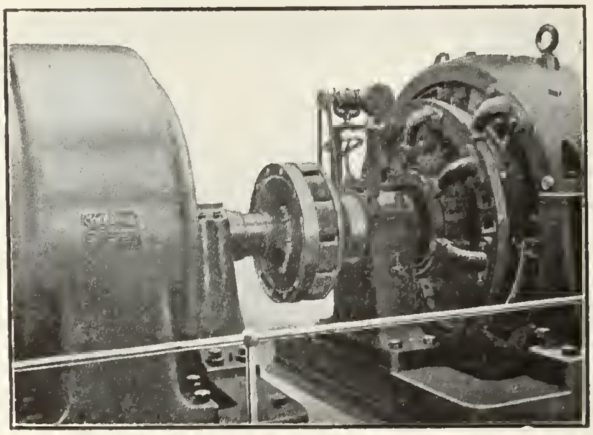

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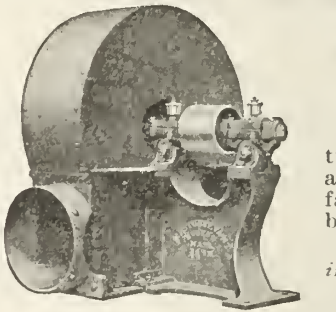

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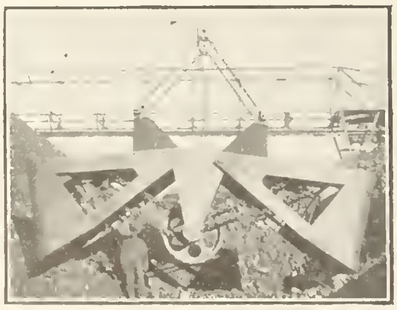

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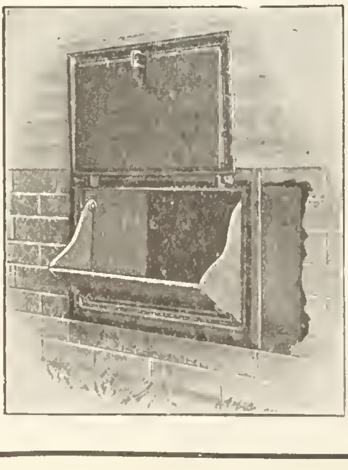

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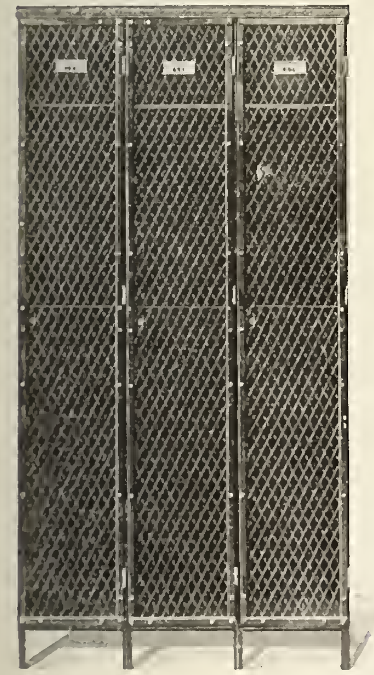

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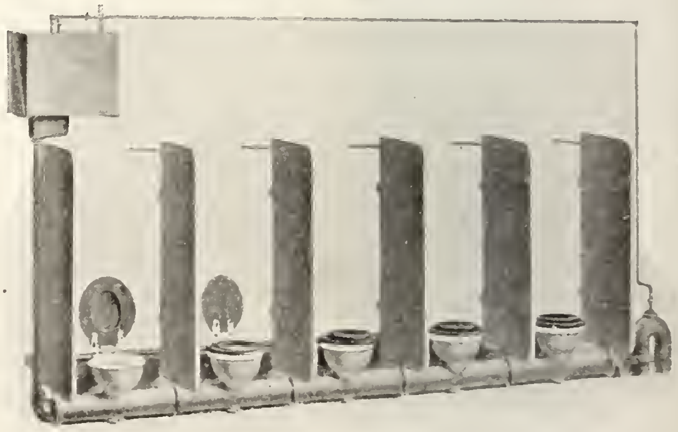

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Vol. 26 January 24, 1912 No. 4

From the Contractor's Standpoint

AMONG some engineers in charge of public works there is a growing tendency to place unnecessary hardships in the way of contractors. Frequently exactions are demanded that mean financial ruin to the contractor. Specifications, loosely drawn, are taken advantage of to force contractors to do work which in justice and fairness they should not be expected to do. There are some civil engineers, most of them but recently graduated from a technical college, who seem to think that it is necessary for them to put a few contractors out of business in order to establish a reputation for themselves. Reputations built up by such methods are neither creditable nor are they likely to be lasting. Engineers with practical experience know this, and they endeavor to be reasonable. Not long since a case of this kind was brought to our notice in respect of a sewer outfall contract. The work of the contractor who was carrying out the job was being declaimed by young engineers, and every day he was losing heavily on the work. Things eventually reached a climax and he requested the chief engineer to take a trip along the pipe line and learn the actual conditions. We could, if we chose, cite many cases, and we insist that a halt should be called on such tactics. Engineers who have had years of experience in construction work understand that questions arising under the specifications must be dealt with in a common-sense way. They have no desire to see contractors ruined, though at the same time they protect the interests which they represent.

The fault often lies in specifications which are not properly drawn, and in the interpretation of which it requires men of experience and common sense. It is an easy matter to prepare plans on paper and draw up certain specifications. At the same time everyone knows that it is one thing to do work on paper and another thing to do it in actual operation. A contractor should be given every opportunity to make a reasonable profit, instead of being harassed and perhaps driven into failure.

Advice to the Young Engineer

THE late Richard Hazen, was not only a most promising young engineer, but also had an unusual gift of forceful expression, says the Engineering Record. The following letter, sent by him to an engineering friend temporarily out of employment, reveals a grasp of the basis of engineering work and of business success that is worth the serious consideration of all young engineers:

"Forget if necessary that you are an engineer and take anything that comes along that will keep you busy. A well-trained engineer or lawyer is well trained for any business. Go after a job for yourself as if you were hired to get yourself a job; as if that were your lifework, and you were selling bonds, instead of your services. Study your mistakes and keep everlastingly at it until you get what you want, and in the meantime keep busy, even if you have to wash dishes for a living!

"New York, of course, does the office work of an enormous engineering business, and the work is wonderful. But in another sense, there is nothing wonderful about it. There is no great secret to be learned here. It is merely the application, over and over again, of the same simple and elementary principles. People seem to think that our firm does good work, but it is all intended to be exceedingly simple. Perhaps that is the reason of success. A successful precedent is a good example to follow. All engineering is of the 'cut and try' order; the great difference is in the degree of care used in finding out the results of the previous 'cut and try.'

The Fear of Commercialism

THE fear of commercialism which some engineers occasionally express is not regarded very seriously in an address recently made by President Dugald C. Jackson, of the American Institute of Electrical Engineers, who pointed out that some people have felt that learning lost dignity by becoming fashionable and by becoming useful. This apprehension is not held any longer, except in those very conservative seats of learning from which nothing of any particular utility has proceeded for many years. In the same way there is nothing in this apprehension of "commercialism," as a destructive influence on engineering, which is not due to greed, deceit and other things that mar the perfect progress of all human affairs. Professor Jackson points out that custom has made the word "cemmercialism" applicable to any undue prominence of commercial ideas and it has thereby come to infer a willingness to establish money in a position of precedence over reason and righteousness. This is certainly a very serious condition if the word actually has such significance, but it should not be so interpreted. We are all proud of our great merchant princes whose names are synonymous with fair dealing and broad business sagacity, and yet their lives have been devoted to "commercialism." Most engineers engaged by manufacturing companies are directly employed in promoting "commercialism" in some form or another. The fact that a man is devoting his time and thought to developing a machine which will do better work at less expense than anything ever before constructed, and that this machine can be placed on the market at a price which will yield a profit to his employers, does not make this work less useful or praiseworthy than that of the engineer who spends his time investigating the properties of the materials used in his profession. There is altogether too much apology by engineers for engaging in work which brings them a profit with the help of salesmen; false notions of the field of usefulness of the engineer will be created by such unwillingness to acknowledge the truth of self-evident facts.

A Valuable Publication

The annual Review Number of the Monetary Times is a most valuable compendim of information relating to Canadian financial and insurance matters. The paper is divided into sections devoted to banking, bonds and credit, industry, insurance, investments and loans, natural resources, the stock exchange, and transportation. These sections are prefaced by a well balanced editorial article showing the conditions of Canadian trade at the outset of 1912. Following this are autograph letters upon the situation and outlook from all the provincial premiers. Each letter is accompanied by the photograph of the writer. The Honorable Mr. R. L. Borden, Premier of Canada, is quoted from his recent speech in New York, with which we are sufficiently impressed to reproduce the portion appearing in the Monetary Times:

> "Canada is an autonomous nation within the British Empire, and is closely and inseparably united to that Empire by ties of kinship, of sentiment and of fealty, by historic association and by tradition, by the character of its institutions, and by the free-will of its people. By the like ties of kinship, by constant social and commercial intercourse, by proximity and mutual respect and good-will this country is closely associated with the United States. There is every reason to believe that Canada is entering upon a period of development and growth even greater and more important than that which we have witnessed in the past. The marvellous growth of our western country will undoubtedly continue, and there is no reason to suppose that similar, if not equal, development will not come to Eastern Canada as well."

The whole number is a model in regard not only to its contents but also to its skilful indexing and arrangement. The Managing Editor, Mr. Fred. W. Field, is to be congratulated.

Engineering and Art

An interesting address was given by Mr. Wyly Grier at the mid-day luncheon of the Engineers' Club of Toronto on Wednesday, January 17. Mr. Grier's remarks were devoted in the main to a consideration of what might be termed fundamentals in the work of the artist, but he also established very clearly the connection between the artist and the engineer, urging those present to bear in mind that the greatest engineers had devoted the most careful study to designing their structures upon artistic lines. With the adornment of the structure by super-imposed ornament the engineer had little concern, but none the less he played an important part in the creation of true art. The great painter, Leonardo de Vinci, whose priceless "Mona Lisa" was stolen from the Louvre in Paris last summer, and who immortalized himself in the painting of "The Last Supper," was the inventor of such practical, labor-saving devices as the bricklayer's hod and the wheelbarrow.

Spending thousands of dollars on alterations to buildings with no other object than to improve their "appearance" is a waste of money, says Insurance Engineering, yet the public records show that this is done in many instances. This is sanctioned by law, because the law does not prohibit prolonging the life of a combustible building. Apparently $30,000 is not considered too much money to spend on alterations to an old building that has become "antiquated." Business men will pay higher rents for "appearances," when a less attractive building may offer greater safety from fire. In one instance cited by a real estate man, alterations to an old building occupied as a store and lofts increased the rent for the store from $540 a year to $2,700, and increased the rents for the lofts from $250 a year to $400 and $600. These external changes are commonly regarded as benefits to the neighborhood in which a building is located, but in a general fire, and even in a local fire, a building that has been improved only in appearances will prove to be as combustible as its "antiquated" neighbors. Many old buildings have been greatly improved, as investments to the owners, by alterations designed to prevent a serious loss by fire. No other kind of alterations can be regarded as permanent investments. There is almost no limit to the number of old buildings that could be improved, with profit to both owners and tenants.

At a meeting of the property committee of the Toronto Board of Education last week a resolution was adopted making it imperative for school contractors to pay union wages and providing against the sub-letting of contracts without the special consent of the Board.

Upon the principle that an advertised contract for municipal supplies should go to the lowest reputable tenderer, the city council of Vancouver, B.C., last week awarded to the Balfour-Guthrie Company, otherwise the British Welding Company, the contract for the supply of steel water pipe for the new Seymour Creek main. The next lowest tender, submitted by a local concern, was $1,500 higher than the British firm's bid. The British firm promised delivery in three and a half months and the local firm two weeks earlier. The city concluded wisely that a square deal by the British firm and a saving of $1,500 was the better course.

The competition for plans for the new Parliament Buildings of Manitoba closes on February 15th. The appropriation for the new buildings is $2,000,000, exclusive of heating, lighting, plumbing and fittings. Provision is required for 183 rooms with a total floor space of over 220,000 sq. ft. In the ordinary way this competition would have attracted contestants from all parts of the British Empire, but inasmuch as the dates set allow Old Country architects only about two weeks for the preparation of plans, the competition is really restricted to Canadian practitioners. Out of the plans submitted five will be selected by the assessor. The authors of these plans will receive $2,000 each. The architect whose plans are finally adopted will be paid 4 per cent. of the estimated cost of the work as accepted in the tender.

Notes on the Construction of Coffer-Dams

Stability, Flexibility and Water-Tightness the Fundamental Considerations in this Class of Work — Discussion of Types and Methods*

By W. D. Lockwood

IN considering the construction of cofferdams, three almost equally important points appeal to me, stability, flexibility, and watertightness. The necessity of the first of these requirements is obvious, and, therefore, requires little argument, for, of course without stability the structure will surely fail with the first flood. The second, flexibility, is probably a point in design that is more often overlooked than any other, and in my opinion lack of it has been the cause of more disasters, and has cost more money than any other defect of cofferdams. The third, watertightness, I think is less important either at the beginning of the work or during the life of the cofferdam, for most leaks can be stopped as the work proceeds or, at least, a sufficient number of pumps can be installed to take care of the leakage.

Hence, leaving out of the discussion for the time being, the first and third requirements as being accepted, let us consider further the second one, flexibility. If a coffer-dam is inflexible and becomes undermined or distorted by a flood, then the other two features of the design are barely able to prevent failure because, in order to have maximum stability, the dam must remain a unit. The instant it is torn apart in several sections, one of these usually gives way and the rest soon follow, and even before the wreck takes place the leakage is so great that the pumps are unable to cope with it.

In considering coffer-dams each new location is a separate problem and must be so treated, as no one design will answer for all locations.

The easiest and most cheaply constructed cofferdam is a simple bank of earth around the excavation. This answers the purpose admirably in the case of shallow still water, say four or five feet deep, where there is a practically impervious bottom and no rise of water need be expected.

Then take the same general conditions with the exception that a rise of water of several feet must be taken care of, and a possibility that the water may overflow into the dam.

First drive a single row of piles, their size and frequency depending on the head of water to be held, with walings spiked or bolted to the piles, and a single row of sheeting placed or lightly driven. The excavated material is then thrown on the outside of the dam to form a tight bank. Thus when the water overflows the dam the wash is resisted by the sheeting and the earth bank is protected.

Of course, as the head increases the size and frequency of the piles must be likewise increased, and the sheeting changed from the simple form to heavy triple lapped sheet-piling securely driven, but there is a limit to the expense when the design must be changed . Judging from my own experience, I would not continue to use this type of dam after a height of ten feet has been reached and even with this height, it could rarely be used to advantage unless a pile trestle were placed just inside the dam to act as a brace therefor. This is a simple matter where the trestle would be needed to carry trains for handling and distributing the material.

Another type of shallow water cofferdams is the flat A-frame support, the frames being laid on their sides, planked over and lightly nailed, while earth is deposited on top. This type of cofferdam is illustrated in Fig. 1. In connection with this type of frame, where much of the spiking must be done under water, a convenient way to do this is the following: The spikes are first started in the plank, then a small piece of pipe, say one inch and a quarter round, is slipped over the spike and a round bar inserted in the pipe over the spike. If the plank is now held under water by means of a crowbar the spike is easily driven by hammering on the round bar previously mentioned.

For heavier cofferdam construction, one of the strongest and most economical I have ever built in

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*Before the American Society of Engineering-Contractors.

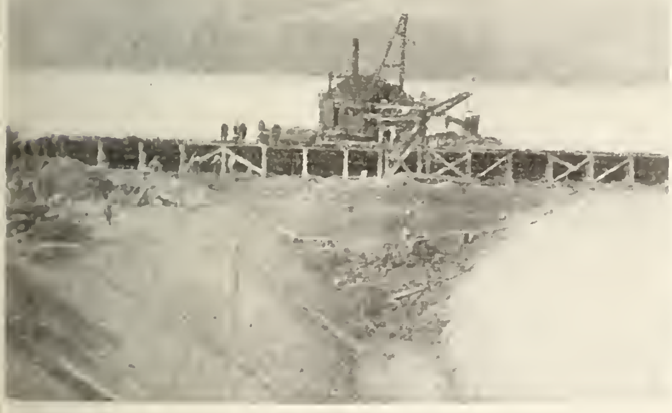


Fig. 1. A-Frame Dam in 4 ft. of water, clay bottom; trench 20 ft. deep.

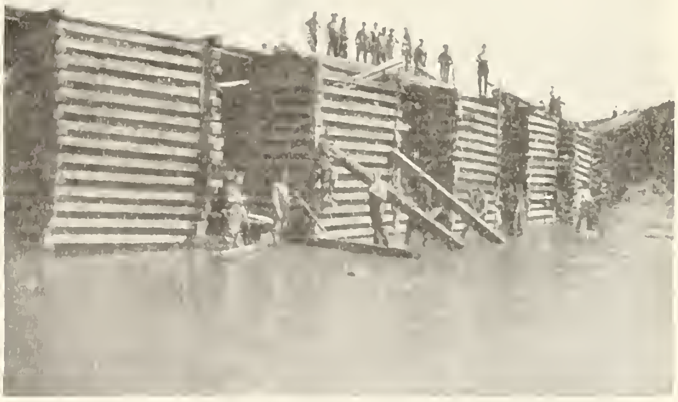


Fig. 2.—Detail of Crib Coffer-Dam.

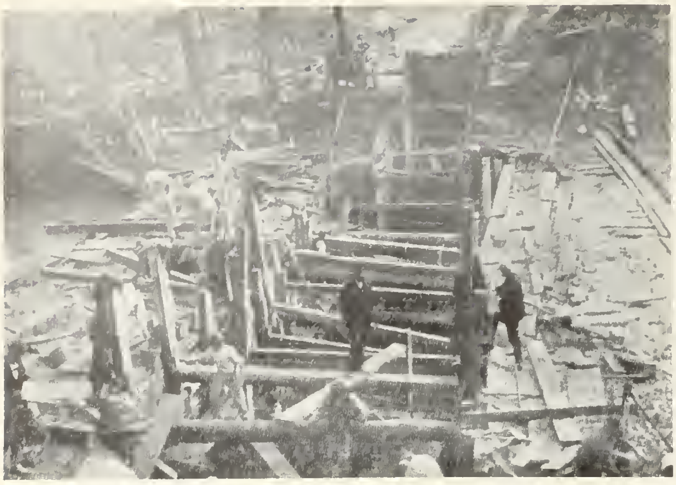
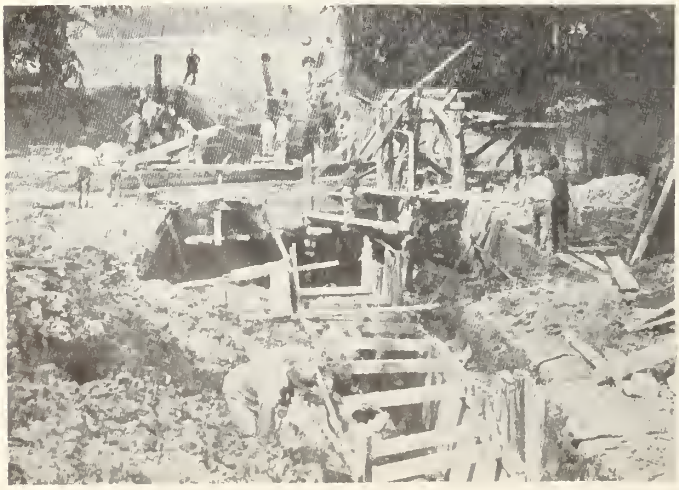


Fig. 3.—Sheet-Pile Coffer-Dam with stream diverted, showing settlement on one side, due to quicksand.

swift running water to a depth of twenty feet is the alternating crib type, illustrated in Fig. 2.

In this type, cribs are built on the line of protection separated with spaces equal to the width of the crib. To install these cribs in a current, a successful method is to first set up a cableway about one hundred feet up stream; then as each crib is built up two or three feet high on shore it is hauled by the cableway out into the river. The crib is afterwards allowed to float down stream to its final position and held there until the timber is built up high enough so that its own weight will hold it. In this way several cribs can be launched in one day as the work of building up can go on continuously, and a track is laid on top of the completed cribs on which material is carried to those that are being constructed. A good way is to have a small night gang get the material out on the completed section for the next day's work.

In building the crib power framing ashore a light flooring of rough one-inch boards is placed over the first row of timber and nailed at one end only so that when the filling is dumped in, the bottom will readily crush under the weight until it rests on the bottom of the river. This feature, while inexpensive, is a very important one. The flooring holds the filling at the beginning and prevents its being washed away by the current. At first bags of earth are thrown in all around the inside edges of the crib and, as the crib is built up to its full height, it is lined with one-inch boards to hold the fill. As quickly as the cribs are completed, track stringers are placed and the track carried ahead.



] Fig. 4.—Sheet-Pile Coffer-Dam with Overhead Flume.

Walings are then placed on the up-stream face across the cribs and rough two-inch planking placed or driven, depending on the character of the bottom, and then one-inch ship-lap boards outside. The earth fill follows, but before the outside fill is placed, bags of earth are dropped in a continuous row across the lower end of the sheeting. In the meantime, one of the workmen with a long pole feels along the bottom to make sure that all the holes are closed.

The object of the alternate cribs is to leave space for the water to pass until the cribs are filled and so to cause but a slight rise of water until all is safe. The lower dam, of course, may be of much lighter construction, and I have found that a continuous cribbing will answer the purpose, as the lower dam can be carried out behind the upper one, and, therefore, is in comparatively still water.

In building cribs it is economical to have all the timber the same size for otherwise there is much delay in carting the various sizes and selecting them. When assembling timber, it is unnecessary to do much careful work except to keep the whole crib plumb. The walings extend not only across the openings, but also in front of the cribs themselves, and thus procure an even and straight surface against which to place the sheeting. In one case a cofferdam of this type was used with about eight feet of water in the summer time. The space inside was 700 feet long and 300 feet between the dams, as the river bottom was used for a yard; yet one five-inch Cameron pump took care of all the leakage. Although a 15-inch pump was set up ready for trouble, it was never needed. In speaking of pumps my advice is: don't buy them second-hand unless you know the pump personally, otherwise you will surely have trouble. That, however, is another story.

As for the lumber used in the cribs, in general, I am sure that squared timber or, at least, stuff flattened on two sides is cheaper than round timber, for the latter requires so much work on the job, that the squared timber works out cheaper and better in the end.

In the case of a cofferdam extending only part way across a river, the upstream face should be extended about twenty or thirty feet beyond the rest of the dam to protect the corner from scour.

In running water, coffer-dams should be built so that a big rise and overflow will do little damage.

According to an official statement the new C. P. R. shops at Calgary, the contract for which has just been let, will number about twenty, including freight car, passenger car and locomotive repairing shops. The locomotive shop alone will cover six acres of land. The machinery in the new shops will be of the very latest design and the tool equipment will be complete in every detail. The shops at Calgary are intended to provide for the repairs to equipment on the C. P. R. western lines.

A system for the protection of gas and water mains against vagabond currents is formed by placing, at suitable spots, electrodes in the ground and connecting them to the positive pole of a low-tension source of electricity (an accumulator or dynamo), while the pipes to be protected are connected to the negative pole.

A Harbor Stage that Walks to its Work

The Piercy travelling stage used in England has some novel features of construction that make it especially serviceable for exposed harbor work. The device consists of a large platform resting on four columns or spuds, a second set of spuds being provided that may be raised and moved ahead while the platform continues to rest on the first set. Then the first set may be raised in turn and moved forward, thus accomplishing a change of position for the whole structure.

There are three separate rectangular frames of steel. The first is supported at its corners on columns, the second rests on the side girders of the first and the third rests on the cross girders of the second. This last frame is the one provided with extra spuds of its own. Upper and lower wheels form the connection between the frames, and these run along the frame above or below as required. The free frame is carried along by these wheels acting as rollers on the bearing girder and supported on the stable part of the structure. Within each of the corner columns is a timber spud that is raised or lowered by a worm gear. These spuds have pointed iron shoes for use on hard bottom and spreading timber shoes for use in sand.

These stages have been successfully used at Peterhead, Dover and Whitby, in England, and one has been recently erected for use at Cape Town, South Africa. They are serviceable in the severest weather, when drill boats, marine pile-drivers, etc., are put out of commission owing to the rough sea. Changes of position can be made in fifteen minutes to a half hour, and the whole stage can be moved 300 feet in ten hours. Above the main platform is usually an upper platform for erecting machinery and materials. An overhead traveller connects it with the shore. In extreme weather the men are sometimes transported back and forth by means of this traveller. When the weather is suitable they go by boat.

Unusual Retaining Wall for Railroad Fill

A reinforced concrete retaining wall, recently built at Bury, England, serves the double purpose of retaining a railroad fill and acting as the back of a series of coal bunkers supplying the electric power station of the town. The wall was built to provide for a widening of the roadbed of the London & Northwestern Railway at this point. As its proposed face was about 14 ft. 6 in. from the outer column line of the power station, the city engineer of Bury decided to utilize the intervening space for the storage of coal and designed the wall to meet this additional requirement. The section, as described in "The Engineer," is the buttressed type, with buttresses spaced 12 ft. 4 in. on centers. Lower buttresses are built from the face of the wall to the building columns and bifurcated to form sloping sides for the coal bunkers. That portion of the base of the wall forming the floor of the bunker is sloped from the foot of the wall to the boiler house floor level while the section under the fill is level. The portion of the wall opposite the power station is 183 ft. long and about 30 ft. high, while a somewhat higher section, serving only to retain the fill, extends 60 ft. further. There are vertical toe walls placed at each edge of the base, throughout the heavy section of the wall, and one such toe wall beneath the fill in the light section. A brick sewer beneath the base of the wall extends almost the entire length of the structure as it crosses the base diagonally at a small angle. This necessitated special treatment at places on account of the grade of the sewer. The wall was designed by the Trussed Concrete Steel Company and the Kahn system of reinforcement was used.

Among the building improvements under way in the borough of Manhattan, N. Y., is a six-storey structure to be used as a candy factory, and while the building proper is of the usual type the architectural treatment of the facade is decidedly out of the ordinary, being Italian in character and of such a nature as to suggest something of the character of the building. According to the architects the base course is of black Quincy granite, above which the first-storey wall, piers as well as the spandrels over the arches, are of glazed brick of a light blue-gray color laid in a pattern with a slightly darker brick than the main surface. Between the piers and the parapet above the cornice the wall surfaces are finished with white stucco.

A rivetted steel siphon 8 ft. 8 3/8 in. inside diameter has recently been built in connection with the hydroelectric plant of L'Argentiere-la-Bessee, which with its 40,000 h.p. is said to be the largest in France at the present time. The plant is situated a little below the union of the Gironde with the Durance, and diverts water from both of those streams for its power development. The work in question as described in "La Houille Blanche," has for its object the reuniting of water diverted at Vallouise on the Gironde with that diverted at Prelles on the Durance. The waters of the Gironde are conducted through a tunnel on the right bank about 4.4 miles long to the point of crossing. At this place the Durance, through erosion, has made a steep rocky gorge above its bed. The narrowest point of this gorge was selected for the crossing and this location gave a span of 220 ft. at the top with a depth of about 325 ft. The siphon spans this in the arc of a circle with a rise of about 28 ft. on the center line. The erection was carried out by means of steel falsework, anchored to the river bed and the walls of rock of the gorge. On this a traveler was erected, with a crane, permitting the lowering of sections into place and subsequent riveting. An air valve is placed at the top of the siphon, while a footbridge affords opportunity for frequent inspection. The difficulties of construction were augmented by violent wind storms which continued almost throughout the year.

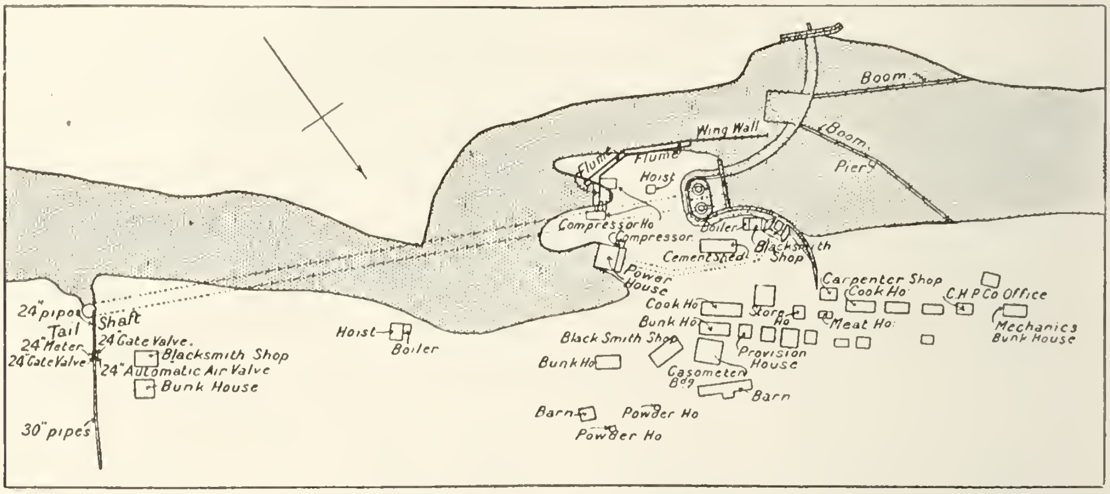
A Western contractor has had his belief in the efficiency of the number seven rudely shaken. This contractor lives in the 7th ward, he was elected to the city council from that ward and his seat number in the council was 17. In addition he was born on March 17, 1877. He thus considered that seven was his lucky number. In a recent job on which he figured he made an estimate of $27,777 and put in his bid at that amount, thinking that with four sevens in it he couldn't lose. But he did, for the lowest bid was $26,999. According to that good old man Deacon Hoyle four sevens always take the chips from three nines. But that rule applies to another game.

As he that lives longest lives but a little while every man may be certain that he has no time to waste.

A Large Hydraulic Air Compressing Plant at Cobalt

About nine miles in a southerly direction from the heart of the Cobalt camp is an abrupt drop of about 50 ft. in the Montreal River, known as "Ragged Chutes." This was chosen as the site for a hydro-pneumatic installation under the Taylor system. The work of excavation was begun early in 1908, and was afterwards taken over by the Cobalt Hydraulic Power Company, Limited, for which company Messrs. Biele, Blackwell and Buck, of New York, are the consulting engineers.

The whole of the work at the site is in a very hard close-grained rock. Across the river at the head of the rapids a concrete dam was thrown to raise the upper water level. The engravings given herewith show the general plan and the profile of the works. A point of rock near midstream was chosen for the site of a vertical shaft which was sunk about 336 ft. deep. From the bottom of this shaft a horizontal tunnel about 20 ft. wide and nearly 30 ft. high was driven down-stream a thousand feet, where it ends at a shaft rising to the tail-water in the river. At about 60 ft. from the latter shaft the roof line of the tunnel drops 8½ ft. Into the top of the headworks-shaft water is permitted to enter, and in its natural course flows through the tunnel and rises to the lower level of the river through the tail shaft, the difference in the water levels being 55 ft.



Site of the Hydro-Pneumatic Works.

By a specially designed head piece in the top of the headworks-shaft air is introduced into the falling water. The mixture descends in the shaft, and when the tunnel is reached the change of direction of flow affords the imprisoned air bubbles an opportunity to escape and collect in the top of the tunnel. The object of the abrupt drop in the roof line of the tunnel near its lower end is to form a closed chamber for the compressed air, and prevent its escape with the tail-water. From the highest point in the tunnel roof the compressed-air main is taken. A blow-off pipe leading to the open air above the tail-water, is provided, so that if air is being compressed faster than it is being taken off by the compressed-air main it discharges into the open air. The lower end of this pipe is ordinarily submerged, and is only uncovered, as is explained later on, when the pressure becomes higher than is desirable.

The degree of compression of the air depends on the level of the tail-water, while the capacity of the plant is determined by the difference in elevation of the head-water and the tail water. No tests of the efficiency of this plant have yet been made, but by comparison with similar installations in British Columbia and in Michigan the efficiency is doubtless very high. The capacity is given as 40,000 cubic feet of free air per minute, compressed to 120 lb. per square inch at the plant. The compressed air is conveyed to the camp, 9 mines distant, by a steel pipe line. The rate charged the customers is 25 cents per thousand cubic feet of air at 100 lb. per square inch at the mine.

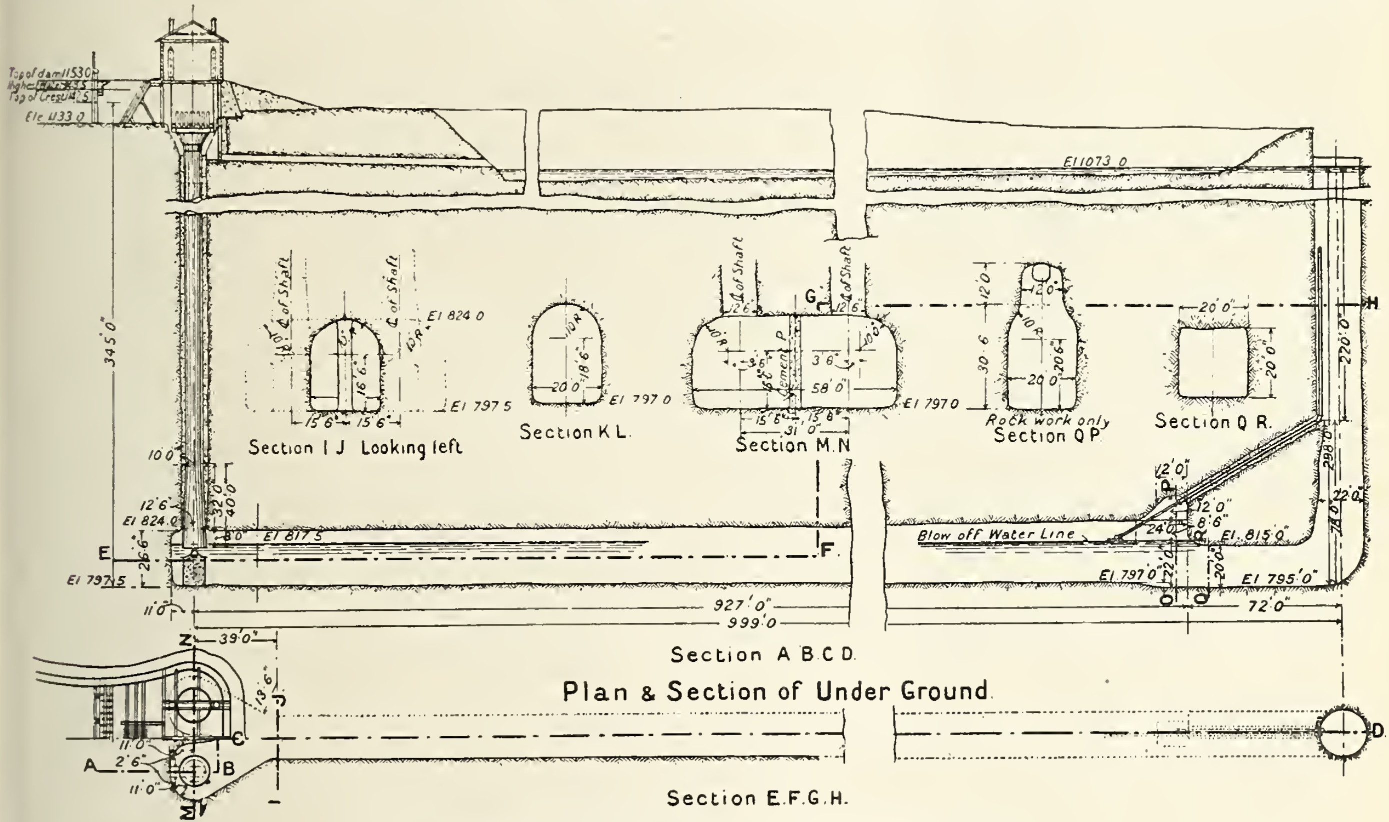
The crest dam constructed to regulate the upper water level is of concrete, of the usual solid section. From the point of rock selected as the site of the main shafts the dam flares upstream to either side of the river, forming in a general way a funnel-shaped mouth to the shafts. On one side, about the middle of the original channel, a slide has been made for the passage of saw logs.

Four submerged openings, 10 ft. square and 10 ft. below the crest of the dam, admit the water to the main shaft. Each opening is controlled by a wooden gate. Before entering the shafts all debris is removed from the water by steel racks placed between the gates and the shaft.

The main shafts are two vertical excavations in the rock, 10 ft. in diameter, 31 ft. apart centre to centre. The original surface of the rock at the top was about 345 ft. above the bottom of the tunnel below. In each shaft is embedded in concrete a steel tube, the diameter of which is 8 ft. 6 in. The top of each tube is placed 26 ft. 6 in. below the upper water level, and is finished with a flange to form a telescoping joint with the head-piece which fits inside it. By means of hydraulic cylinders the head-piece may be raised or lowered to compensate for slight variations of the water level. The body of the head-piece tapers from a fit in the 8 ft. 6 in. pipe up to a drum head 16 ft. diameter, into which are fixed sixty-six open pipes 14 in. diameter and 8 ft. long. In operation the heads are maintained at such a height that the open tops of the 14 in. pipes are slightly below the surface of the water. Care is taken to have the interior of the tubes quite smooth throughout and angular corners are avoided, thus allowing the mixture of air and water to flow smoothly and uninterruptedly to the separating chamber in the tunnel below.

The bottom 40 ft. of the main tube is increased in diameter gradually until at the end it is 12 ft. 6 in. This flare is for the purpose of decreasing the velocity of flow within it, and so facilitating the release of the air from the water. The bottom end of the tube is 18 ft. 6 in. above the bottom of the tunnel, and is sealed 18 in. by the water in the tunnel. Immediately below the centre of each shaft tube is a circular concrete pier with a pagoda-shaped top, for the purpose of deflecting horizontally in every direction the air-laden water descending in the pipe, so as to afford the air bubbles an opportunity of quickly disentangling themselves from the water and collecting in the crown of the tunnel.

The tunnel is 999 ft. long from centre to centre of the shaft at either end of it. The water line in the tunnel is determined by the height of the blow-off or point of escape of the air, which has been placed at 325 ft. below the level of the crest of the headworks dam. This gives a normal depth of water of 20 ft. in the tunnel. The top of the tunnel forms the compressing chamber for the air, the pressure being fixed by the relative height of the water in the tunnel and that at the point of discharge in the tailrace, which is about 276 ft.



Plan and Sections of Hydro-Pneumatic Compressor Plant.

The general section of the tunnel is 20 ft. wide by 28 ft. 6 in. high, the top being semi-circular. The upstream end in 39 ft. flares out to admit the two main head shafts. The tail shaft is 22 ft. in diameter, rising vertically to the river from the end of the tunnel. The highest point of the ceiling of the tunnel is about 70 ft. from the tail shaft, and from it the compressed air is taken through a 24 in. steel pipe embedded in concrete as far as the tail shaft, in which it rises to the meter house on the top of the cliff above.

The blow-off pipe is 12 in. in diameter. Like the main air pipe, it is sealed in concrete between the tunnel and the tail shaft. It has on its lower end a funnel-shaped casting. When the air is being compressed faster than it is drawn off the water level in the tunnel is lowered, and as soon as the end of the blow-off pipe is exposed the air immediately escapes up the pipe until the water level rises in the tunnel sufficiently again to seal the end of the blow-off. The meter house on the cliff contains a 24 in. gate valve, a 24 in. automatic valve and a 24 in. meter. Following the meter a reducer joins the 24 in. main to the 20 in. pipe line leading off to Cobalt.

Not the least interesting part of this plant is the long lines of large air mains through a very rough and rocky part of the country exposed to very wide ranges of temperature.

All 12 in. and 20 in. pipes are welded steel with welded steel flanges. The specifications for the pipe required open-hearth steel suitable for welding, with an ultimate tensile strength of not less than 55,000 lb. nor more than 65,000 lb. per square inch, elastic limit not less than half the ultimate strength, and an elongation not less than 25 per cent. in 8 in. All pipes were tested to 450 lb. per square inch with hydrostatic pressure. The lengths varied from 35 ft. to 40 ft. Flanges were turned on back and front. The bolts for the joints are of steel. The 20 in. pipes have the body 0.3125 in. thick, with flanges 3½ in. by 1½ in. drilled for twenty-four 1 in. bolts. The flanges on 12 in. pipes are 3½ in. by 1¼ in., drilled for twelve ⅞ in. bolts, the body of the pipe being ¼ in. thick. The gaskets used throughout are of millboard about 1/16 in. thick. All the joints in the 20 in. pipes were made square, bends in any direction being made up by bevel fillers placed between the flanges. In some of the more difficult country around Cobalt universal joints were used on the 12 in. pipe. At the lowest points drip cocks are placed to enable the condensed water collecting in the pipe to be drawn off.

Practically no excavation work was done in the pipe laying. At every half-mile there is a concrete anchor pier 5 ft. lengthwise of the line and 8 ft. across the line. In this pier the pipe is embedded and anchored. Midway between every two adjacent piers is an expansion joint for a 20 in. pipe, and for a 12 in. The joints on the 20 in. pipe have been known actually to move 27 in. as a result of temperature changes. Between the anchor piers the motion is permitted by supporting the pipe flanges on 12 lb. rails laid parallel with the pipe and resting on wooden ties ballasted in the ground. Where there are horizontal bends the rails are replaced by a ½ in. steel plate, so as to permit motion of the flange on it in any direction. All lines of 6 in. pipe and smaller have screwed connections.

Every consumer's connection is equipped with a gate valve, an automatic valve, and a meter, around all of which is a by-pass containing a gate valve to facilitate possible repairs. There were laid at the time of writing 9 miles of 20 in. pipe, 6 miles of 12 in., and 7½ miles of 6 in. and 3 in. pipe. Thirty-five connections have been made to customers.

The pipe line laying was done by the company by day labor. The 20 in. pipes were furnished by Thyssen & Co. and Deutsch-Oesterreichische Mannesmannroehren Werke, Germany, while the latter company and Stewart & Lloyds, Limited, Glasgow, supplied the 12 in. pipes. The valves were manufactured by the Eddy Valve Company, Waterford, N.Y., and the expansion joints by Reid & Brown, Toronto. The penstock work was made by Ferand & Delorme, Montreal, the meters by the company themselves. The excavation and concrete work was performed by H. D. Symmess, Niagara Falls, and by the company. The dam and shafts were begun in 1908, and the tunnel and pipe lines in the spring of 1909.

The air compressed by the hydraulic system is very dry as compared with that produced by the ordinary methods of mechanical compressors; but in the mines where there is inadequate ventilation its slight deficiency in oxygen renders the use of ordinary candles impracticable by the miners. This difficulty was overcome by supplying the miners with acetylene bicycle lamps. It is stated that these are even cheaper in the long run than candles, and, in addition, their superior illumination enables more work to be done.

Sewer Gas and Concrete

In a report by Messrs. Metcalf & Eddy, consulting engineers of Boston, Mass., which deals with plans proposed by Mr. William F. Williams, city engineer of New Bedford, Mass., for the construction of intercepting sewers and disposal by dilution in Buzzards Bay, the question of the effect of sewer gas on concrete is discussed. Concrete, the report states, is known to be affected under some conditions by gases generated from sewage, chiefly, it is believed, hydrogen sulphide. Where the sewage is admixed with salt water the amount of sulphur compounds from which hydrogen-sulphide gas may be formed is increased. A portion of the intercepting sewer proposed for New Bedford will at times contain a mixture of sewage and salt water; the velocity of flow in this portion of the line will often be low enough to cause a precipitation of solids in the sewer. These will decompose more or less rapidly, and it is quite possible that under these conditions some hydrogen sulphide will be generated and may be liberated from the sewage. In view of these conditions Messrs. Metcalf & Eddy advise lining the invert and arch with a single course of hard burnt brick, or constructing the sewer entirely of brick, as economy shall dictate in the section which may contain salt water. In this way, it is stated, the danger of injury from the action of gases will diminish, and it will be easier to repair any damage which may be done and which will probably be largely confined to the joints than if concrete were used. The use of brick lining, however, is not believed to be imperative; if it should be decided to build a sewer wholly of concrete the sections should be increased by a thickness of from 1 to 2 in. on account of this possible corrosive action. The concrete should be proportioned 1 part Portland cement, 2 parts sand and 4 parts broken stone instead of 1:2½:4¼ or thereabouts which it is proposed to use for the remainder of the sewer system to which salt water must not be admitted .

Wood, Concrete, Steel and Cast Iron Conduits

In the report of Rudolph Hering on the selection and utilization of a new source of water supply for Charlestown, S.C., an estimate is given on the cost of bringing the water to the city through about 23 miles of pipe, the pipe line to have a capacity of ten million gallons in 24 hours. A 36-inch pipe was calculated as being the size required. In deciding upon the material to be used, an estimate was made on continuous wood-stave pipe, machine-made wood-stave, reinforced concrete, lock-bar steel pipe and cast iron pipe. Reinforced concrete pipe was not estimated on for use where the head gave a pressure exceeding ten pounds per square inch, but for greater pressures it was designed to substitute either cast iron or steel pipe. Concerning these several materials Mr. Hering said: "Continuous wood-stave pipe, such as has been used in numerous places in the west and to a more limited extent in the east, if properly designed and well built and banded in the trench has been found to make a satisfactory conduit, quickly and easily constructed and low in first cost and maintenance.

"Machine-made wood-stave pipe is somewhat similar to the continuous wood-stave pipe, except that it is made in the shop, the wood-staves being banded with the steel bands by machine. The pipes are shipped in convenient lengths and are joined together in the trench. Under certain conditions the machine-made wood-stave pipe is to be preferred to the continuous wood-stave pipe."

In comparing the costs of a line built of these materials it is estimated that trench excavation would cost 30 cents per cubic yard, and that the pipe in place in trench would cost as follows, 36 inches diameter being assumed in each case: Continuous wood-stave pipe, $3 per foot. Machine-made wood-stave pipe, $3.60 per foot. Reinforced concrete pipe, $5.75 per foot. Lock-bar steel pipe, $5.76 per foot; cast iron pipe, $6.30 per foot. It was apparently assumed that the co-efficient of roughness would be the same for each class of pipe, and consequently that the diameter would be the same whatever the material used.

The discovery of valuable deposits of clay on federal property in Australia, led the Government to establish a brick-making plant to manufacture the brick to be used in the new capital buildings.

Report of the Good Roads Committee of The Canadian Society of Civil Engineers

The following is the report which will be presented at the annual meeting of the Canadian Society of Civil Engineers by Mr. A. W. Campbell, chairman of the committee appointed to consider the question of good roads and street construction and maintenance, and to draw up a standard of classification and specification of good roads in Canada. In presenting this report, Mr. Campbell remarks that it would be very difficult to prepare a standard specification which would meet the requirements of all sections, with varying conditions of climate, soil, traffic and available material. At the same time it is believed that the draft specification submitted embodies the best practice in the work.

ROAD SPECIFICATIONS

A standard specification should not be understood as one to be followed rigidly under all circumstances. Properly treated, no two miles of road should be constructed in precisely the same way. For this reason every road should be a problem in itself, to be treated in accordance with local conditions and requirements, always, however, following the scientific principles underlying the making of good roads. A standard specification is one that may be drawn upon to meet average conditions, but in every case it should be varied to meet the special requirements of the work undertaken.

Owing to the great variation in requirements, particularly in the grading and drainage of a new road, it is exceedingly difficult to draw up a specification which will not be cumbersome and which will not, because of intricacy and indefiniteness, cause contractors to be alarmed to such an extent that their prices will be considerably advanced. For this reason the great majority of municipal councils have been in the habit of building roads by day labor rather than by contract. In justice to the work, road specifications should be simple and definite, but the necessity of safeguarding the municipality from "scamped" work makes an ideal difficult to reach.

As between work wholly performed by day labor, and the other extreme of contract work there is a middle field of safety to the municipality. It is that all earth work, including draining and grading, should be done by day labor under the municipal road superintendent. For this work he could use the grading equipment which all municipalities possess, and could carry on the work at the most favorable season of the year. Having provided for grading and drainage, with incidental details, the placing of stone or other road metal could readily be let by contract.

The standard specifications in this report have been prepared with a view of a simple treatment of all classes of work performed under contract, but should be modified to meet special requirements. They express a standard required for county road systems, but in their application to municipal work should be accompanied by general conditions such as those attached to the specification for steel bridges.

STANDARD SPECIFICATION FOR STONE AND GRAVEL ROADWAYS

Scope of Specifications.—(1) The work covered by these specifications is to include the supplying of all labor, machinery plant or materials which are needed to construct durably and expeditiously, and to fully complete ready for travel a roadway which is, in general, to be straight and in the centre of the road allowance, with a uniform width between the inside of open ditches. Roads are to be given an easy flowing grade, cutting hills and knolls, and filling depressions. The steepness of hills is in no case to exceed a rise of four per cent. On roads not previously metalled, earth excavated from the ditches is to be drawn to the centre to form the grade or turnpike. On old stone or gravel roads, earth shoulders are in general to be turned away from the centre, across the open ditches, if so directed, and the crown of the road restored by placing new metal on the old stone or gravel base.

Plans, stakes, etc.—(2) All work under these specifications is to be in accordance with the plans, profiles, and schedules forming part of these specifications, and to the lines and levels given on the ground by the engineer. Stakes and bench-marks placed for this purpose are not to be moved or effaced when avoidable.

Width of road.—(3) The width of road shall be uniform unless otherwise directed, for curves or other irregularities, widths of grade between shoulders to be twenty-four feet, and the stone or gravel 8 feet wide for single track roads, and 14 feet wide for double track.

Crown.—(4) The finished and consolidated roadway is to be circular and have an average crown of one inch to the foot from side to centre. Earth excavation and the placing of stone are to be uniformly such as will produce that camber, except as otherwise directed by the engineer in case of hills, swamps, rock outcrops, and other irregular conditions. Where the width and quality of stone used in the road will permit, the average crown may be reduced to one-half an inch to the foot, if so directed by the engineer.

Excavation and fill.—(5) Excavation or fill is to be made in all cases to the required depth below the elevation of the finished roadway. Surface soil, vegetable mould, logs, stumps, or other work or perishable material are to be removed to a sufficient depth to secure a firm foundation, and such excavation shall be filled with durable material to the height of the sub-grade. The sub-grade thus obtained is to be made thoroughly firm and solid by pounding and rolling. In swamp land, roots and muck are, if practicable, to be removed in advance of filling, to a firm bearing.

Roadsides.—(6) The land at the sides of the road, between the gutters or open drain, and the fences, is to be graded from margin of the roadway, as may be directed, the roadsides to be left smooth by grading and levelling, care being taken not to injure or bark trees and shrubs that may be marked for preservation, or where such preservation is directed by the engineer.

Lanes and street intersections.—(7) All intersections of roads, lanes and entrances are to be properly graded, and stoned or gravelled as directed, to conform to the finished grades of the intersecting roadways; and tile or other culverts or crossings are to be well laid, under instructions from the engineer.

Broken stone surface and quality of stone.—(8) The surface of the roadway is to be covered with crushed stone to a minimum depth of eight inches after consolidation, to be regularly and perfectly spread over the whole of the roadbed to a depth to conform to the cross-section shown on the drawings. The crushed stone is to be durable limestone, granite or field stone, of such quality and broken to such dimensions as may be approved by the engineer. All stone used must be free from clay, loam or earthy material. Samples of material to be used are to be placed with the engineer, and all material thereafter to conform to the quality of such samples.

Placing stone on the roadway.—(9) The broken stone is to be placed on the roadway in the following manner :

(a) Coarsely crushed stone or "tailings" of a size that will pass through a four-inch ring, and be retained by a two and one-half inch ring, is to be placed over the central portion of the sub-grade to such a depth and width as the total depth of stone will permit; this is to be rolled dry to a firm and even surface, and additional stone is to be added wherever depressions appear, or the camber becomes too flat under the roller. Where "tailings" are not available, their place shall be taken by the grade of stone described in the following sub-section:

(b) Upon this shall be spread a layer of crushed stone, such as will pass through a three-inch ring, and be retained by a one and one-half inch ring, to be four inches in depth after consolidation at the centre, and such further depth at the centre and sides as will bring the roadway to the line of the finished grade. This is to be added wherever depressions appear or the camber becomes too flat under the roller.

(c) The roadway so formed shall be coated with screenings; these to be thoroughly saturated and rolled until perfectly consolidated to the satisfaction of the engineer. Screenings are to consist of stone chips and dust, such as will pass a one and one-half inch ring, an excess of dust to be removed by a dust jacket attached to the screen, if required by the engineer. Screenings are not to be dumped from wagons on the stone, but are to be spread from the wagons or from piles deposited along the roadside.

Screenings not to exceed necessary amount.—(10) Special care must be taken that the screenings shall not be in excess of the quantity necessary for consolidating the road, nor shall less be used than is needed to maintain a smooth surface. The screenings shall be uniform and thinly spread, and additional quantities shall be added as may appear necessary after watering. Screenings are to be added to or removed from the surface as may appear necessary to the engineer, at any time during the progress of the work.

Manner of rolling and wetting roadway.—(11) Rolling shall be commenced at the edges or curb of the road, working towards the centre, and shall be continued until the earth sub-grade and each layer in succession is firmly set. The final rolling must be continued until the roadbed is perfectly consolidated and unyielding, to the satisfaction of the engineer. During the whole of the final rolling herein specified, a sprinkling cart is to pass immediately in front of the roller, so that at all times the surface of the road will be saturated with water.

Gravel.—(12) Gravel where expressly permitted by the engineer shall have a minimum consolidated depth of eight inches, and the widths of metal, drainage, grading and all other details and requirements wherever applicable, as stated elsewhere in this specification, shall apply. The gravel used shall be clean, free from an excess of clay, loam or sand; shall be compact and composed of varying sized grains up to two inches diameter. If the gravel contains large stones these are to be removed at the pit, or if drawn to the road may be raked forward and spread in the bottom of the road. Should the gravel contain an excess of large stone, or of fine material, treatment by crushing, or screening, or both, shall be provided, such as is necessary to produce a satisfactory road metal. Where gravel does not consolidate readily or sufficiently by rolling, approved material, such as limestone or screenings may be lightly spread over the surface to provide the necessary bond. The gravel, spread to a uniform depth, shall be made wet by sprinkling and rolled until thoroughly consolidated. When crushed or screened gravel is used, care must be taken to use no more screenings on the surface than is necessary for consolidation. The quality of gravel, preparation, method of placing on the road, and means of consolidation must be, in all respects, approved by the engineer.

Surface drainage.—(13) Open drains or gutters shall be formed along each side of the roadway, of sufficient capacity to carry to an outlet all water entering them, the grade of such drains to follow, where practicable, that of the roadway, but preferably having a minimum fall of three inches in 100 feet. The slope of gutters is to be uniform and without pockets or depressions. On hills and hillslides, where suitable outlets cannot otherwise be obtained, surface water shall be received into catch basins at suitable intervals, and discharged to an outlet through underground tile, vitrified sewer pipe being preferably used for that purpose. On hills, concrete or cobble gutters may be required where the rush of surface water is likely to cause erosion.

Tile drainage.—(14) Tile drains, where required to remove an excess of sub-soil water, to tap springs, to dispose effectively of surface water, to protect hills or road intersections, shall in general be placed along the side of the roadway, under the open drain or gutter, and shall be of not less diameter than five inches. The tiles are to be placed in an eight-inch trench, the bottom of the trench to be 36 inches below the sub-grade of the roadway. They are to be uniformly and evenly laid with a fall of not less than three inches in a hundred feet to a proper outlet, and with ends closely abutting. All tile used shall be of the best quality of clay, manufactured expressly for drain purposes, in lengths not less than one foot, and of uniform diameter throughout. Earth excavated in the laying of these drains shall be returned to the trench, being consolidated on hills, or slopes, if considered necessary by the engineer, to prevent its being washed out, and in every case so disposed of as not to interfere with surface drainage. Where the bottom of the trench is in quicksand, satisfactory means are to be used to keep the tile in a true line, and free from sediment, by laying on a board, surrounding with cinders, sawdust, cotton or cheesecloth.

Foundation of large stone.—(15) Where the natural roadbed is weak, flat, or for any other reasons a strong foundation is desirable, a foundation shall be laid below the stone referred to in Section 9 of this specification, such foundation to be constructed of cobble stone, coarse gravel or rough quarry stone of a size not exceeding eight inches in largest dimensions, and of such depth as, in the opinion of the engineer, the work may require. This foundation is to be rolled to the satisfaction of the engineer: this to be followed by a layer of crushed stone described in Section 9 (a) of this specification. Roads of light or blow sand are to have an eight-inch layer of clay, or gravel containing clay, laid as base for the metal covering, such clay or gravel to be thoroughly rolled and consolidated before the metal surface is applied.

Side slopes.—(16) Side slopes in cuts and fills are to be one and one-half feet horizontal to one foot vertical. Earth for fills on side-hills and through ravines where the grade cutting does not provide sufficient materials, is to be obtained from the tops of hills, or such other point as directed, in order that the natural slope of the earth may be maintained and slipping prevented, as far as practicable.

Rip-rap.—(17) Rip-rap, where required to protect the face of embankments or the foot of slopes, unless otherwise directed, shall be of undressed field or quarry stone, land by hand to a uniform thickness, each stone to be firmly embedded, and at a slope not exceeding one foot horizontal to one foot vertical. The largest stone adapted to the work is to be used.

Concrete tile culverts.—(18) Concrete tile culverts, where required, are to be of such size and length and at such depths as may be determined by the engineer, and are to be placed where shown on the plans hereto attached, are to be placed and connected with tile and free outlet, so that water will not stand in them. The spigot end is to be down grade and joints are to be fitted and made tight with cement mortar. The trench to receive the tile is to have a concave bed, so that the tile will have an even bearing, the earth is to be firmly packed and rammed around the tile, and a minimum depth of one foot of earth is to cover the tile. Each end of the culvert is to have a concrete headwall sunk below the frost line and of such dimensions as may be necessary for a retaining wall to suit the situation. Concrete tiles are to be strong and of the best quality, sound, free from all defects, smooth, uniformly circular and made in accordance with an approved specification.

Catch Basins.—(19) Concrete catch basins, in accordance with the plans hereto attached. Culverts are to be laid with a good fall drains, at such point and at such depth as the engineer may designate, iron covers, for this purpose to be provided.

Cobble-stone gutters.—(20) Cobble-stone gutters will generally be three feet wide, but are to be of such width and contour as the situation may require. They are to be made of stones from 4 inches to 6 inches long, and from 2 inches to 4 inches wide, set on end and bedded in an 8-inch layer of gravel or coarse sand. The upper interstices of the stones are to be filled with fine gravel or coarse sand, and the whole thoroughly rammed to a firm bearing.

Concrete gutters.—(21) Concrete curbs and gutters, if required, shall, unless otherwise directed, be in accordance with the dimensions shown on the drawings hereto attached. The Portland cement, all materials, methods and workmanship, shall conform to the best of modern practice and standards. The curbing and gutters shall be thoroughly tamped and consolidated. The curb and gutter shall consist of a concrete core or backing, with a one-inch surface coat of mortar; the concrete core to be mixed in the proportion of one part of Portland cement, three of sand, and five of broken stone; the surface coat to consist of one part of cement and two parts of sand.

The entire exposed surface shall be neatly faced by floating and trowelling with a coat of neat cement, and finished with a dampened bristle brush, so as to give a uniform color throughout.

The work shall be carried on as rapidly as the concrete can be thoroughly rammed, and the whole curb and gutter shall be completed while in a soft and plastic state, so that it will be monolithic when set.

The curb shall be divided into sections eight feet in length by such means as will insure complete separation. At road and lane intersections the curb shall be made on a curve of suitable radius, with true and even joints.

The temporary forms used in shaping the gutter and curb shall be set accurately and firmly in place.

Roads and Road Building in Japan

Mr. Carl F. Deichman, United States consul at Nagasaki, has written an interesting paper on Japanese roads and road building which throws considerable light on the policies and methods of the Japanese people regarding this important issue, and incidentally points at a tentative opportunity for a profitable investment of American capital and brains.

According to this authority a large percentage of the country roads in Japan is of rather a primitive character, and adapted rather to the use of pedestrians and light jinrikishas than that of heavy traffic. Practically the only roads which might be termed of modern or scientific construction are the principal state or prefectural roads which have been laid out by engineers of fair training, and are designed for use as military highways in case of war.

By imperial ordinance Japanese roads are divided into three classes, state, prefectural and city, town or village roads.

The state roads, of which there is a total of about 00 miles, are such as run from principal cities to open ports, to and between prefectural offices and army and navy garrisons. They are required to have a width of 42 feet including a roadbed of not less than 24 feet and side pirkings of not more than 18 feet in combined width.

Prefectural roads are such as connect prefectures and garrisions, or connect prefectural with branch offices, and run between important towns and seaports. The stipulated width is 24 to 30 feet. There are 3,332 miles of prefectural roads in Japan. In many cases the prefectural and state roads run along identical courses. The cost of construction and maintenance of both state and prefectural road is in most cases at the expense of the prefectural fund.

City, town and village roads, 20,011 miles altogether, are constructed and maintained by the inhabitants of the districts in which they run. There is no fixed width prescribed for these roads.

Special assessments for road revenues are unknown, the expense being met by appropriations from the general funds of the various territorial subdivisions. Tolls are sometimes exacted when any unusual expense such as the construction of a bridge has been necessary.

State and prefectural roads are under the charge of university or technical school graduates with an occasional specialist where unusual conditions exist. City, town and village roads are under the supervision of officers selected by the district assemblies.

Contracts for construction and maintenance are awarded after advertisement for competitive bids to persons who are qualified by not less than two years of practical experience and who pay a specified amount of income tax. Contractors are subject to supervision by official engineers.

Methods of construction are decidedly elemental. For leveling and compacting surfaces, iron and stone rollers drawn by laborers are frequently used but more often this process is left to traffic after the surface has been smoothed by hoeing.

Ordinary road laborers are paid, on an average, 55 sen (27 cents) a day. The employment of convict or pauper labor has not yet been tried.

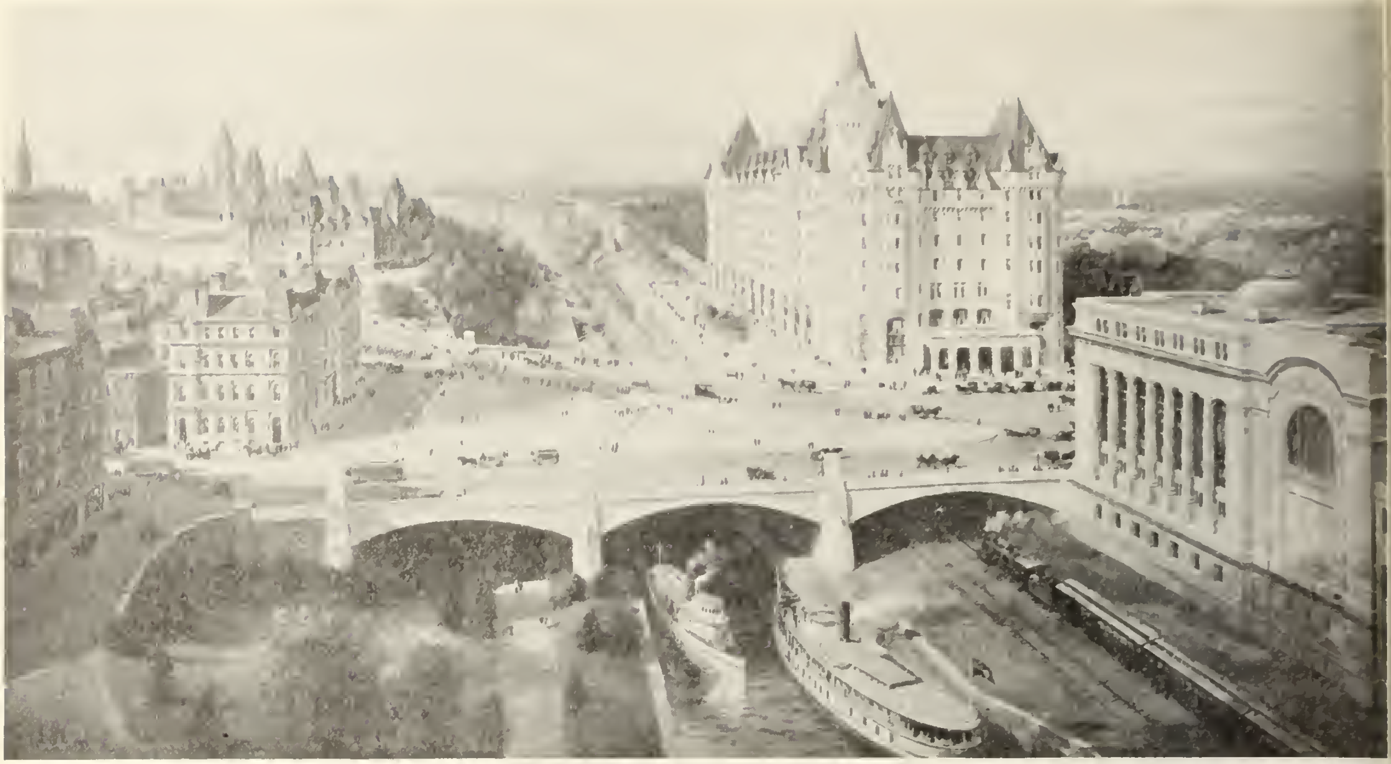
Traffic regulations are of a negligible character. Automobiles with the exception of a few omnibuses which are licensed, inspected and restricted to a speed of 8 miles an hour in town are not noticed officially. Bicycles are subjected to a tax of six yen $2.99 per annum in certain cities.

Available materials for road building consist of a variety of classes of stone comprising granite, syenite, diorite, diabese and related kinds of rock. By-products of mines, furnaces and mills are also used freely where locally available. All rock crushing is done by hand.

No mention of bituminous, concrete, wood or in fact any other material than stone is mentioned in Mr. Diechman's paper.

A 5,500 horse power winding engine is to be installed at a mine in Southern India and is designed to serve a 3,700-ft. shaft, hoisting at a rate of 3,000 feet per minute. The winding drum, according to "Engineering," is of the cylindro-conical type, and has a maximum diameter of 20 feet. The total weight of the engine is 250 tons. It is fitted with Corliss valves. The main shaft is 25 in. in diameter at the drum and 21 in. at the bearings, the drum being grooved to receive 1¾-in. rope. The depth of the cage in the shaft is indicated by a pointer which revolves upon a circular dial.

A lazy man is just about as useless as a dead one—and besides, he takes up more room.—Elbert Hubbard.



Picturesque view of the Federal Capital showing the new G.T.R. station and Chateau Laurier, recently completed.

A Notable Group at Ottawa

In the accompanying illustration there will be recognized some of the finest buildings in Ottawa. There is no need to say anything concerning the Parliament Buildings or the post office, but a few words descriptive of the new Chateau Laurier and G. T. R. station may be of interest, although progress articles on both works have been published at various times in these columns. The Chateau Laurier is one of the finest hotels in the Dominion. It was designed by Messrs. Ross & Macfarlane, of Montreal, and constructed by the Geo. A. Fuller Company, New York and Montreal. It is situated on the south-west corner of Major Hill Park, and is directly opposite the new station of the G. T. R. As will be seen from the picture, a part of the scheme is a broad plaza on the bridge between the two buildings. The design of the hotel is in the old French "Chateau" style of architecture and is similar to the Chateau St. Louis of Quebec, which was built on the site where the Chateau Frontenac now stands. There are two wings set at an angle of about 120 degrees to a central tower of circular shape; each of the ends of the wings and the points of intersection is finished with a tower. The exterior work of the basement up to the first floor level is of granite and the general body of the building of light buff Indiana sandstone. The long sloping roof is of tile, supported by T-irons, fastened to the structural part of the roof. The building is entirely fireproof, the floors being reinforced arches, finished in marble tile on cement. The floor slab itself is 4 inches thick, carried on steel beams and girders. The whole of the structural steel beams and girders are fireproofed, so that at no point are they covered with less than 2 inches of concrete. The stairs are of cast iron.

Chateau Laurier under construction. — Architects, Messrs. Ross & MacFarlane, Montreal; contractors, The Geo. A. Fuller Company, Montreal.

The interior work is selected red birch, excepting the ground floor and ball-room, which are in quarter-cut red oak. The inside winter sash are in three pieces of birch and oak to match the rooms, and the outside sash are clear white pine. The doors have heavy double frame mouldings and one large panel made in five-ply.

A passage is constructed from the hotel under the bridge, to the station, for the convenience of guests, leaving or arriving on trains. There are 350 sleeping apartments in addition to reception rooms, dining rooms, rotunda, &c. The power house which will supply the hotel with distilled water for the tank in the roof, electric lighting, steam for the laundries, heating the buildings, etc., is completely separated from the hotel at a distance of about 400 yards. The cost is about $1,500,000.

G. T. R. Central Station

This passenger railway station is erected on the southerly side of Rideau street, between the Correy Building and the canal. The Baggage and Express building, which immediately adjoins in the rear, accommodates the baggage, express, immigrant rooms and power plant. The station building is generally 147 feet in width by 180 feet in depth, and between the building and the tracks a concourse of 60 feet in width for the general circulation of passengers is constructed.

In the main building, on a level with the railroad tracks there is located the general waiting room, which has an area of over 9,000 feet. Along the four sides of the waiting room are ticket, telegraph and telephone booths, information bureau, news stand, and parcel room. A broad covered passage at the eastern end of the concourse leads to the baggage room, and on the Rideau street side of the large general waiting room are located the waiting rooms for men and women, barber shops, lunch counters, &c. A passage, 20 feet wide, running north and south, leads directly from the general waiting room to the hotel. A spacious carriage court available for cab service has been provided. The main waiting room extends to the height of four storeys, or about seventy-five feet, and is lighted by eight arched windows. The upper floors of the main building are arranged for general railway offices.

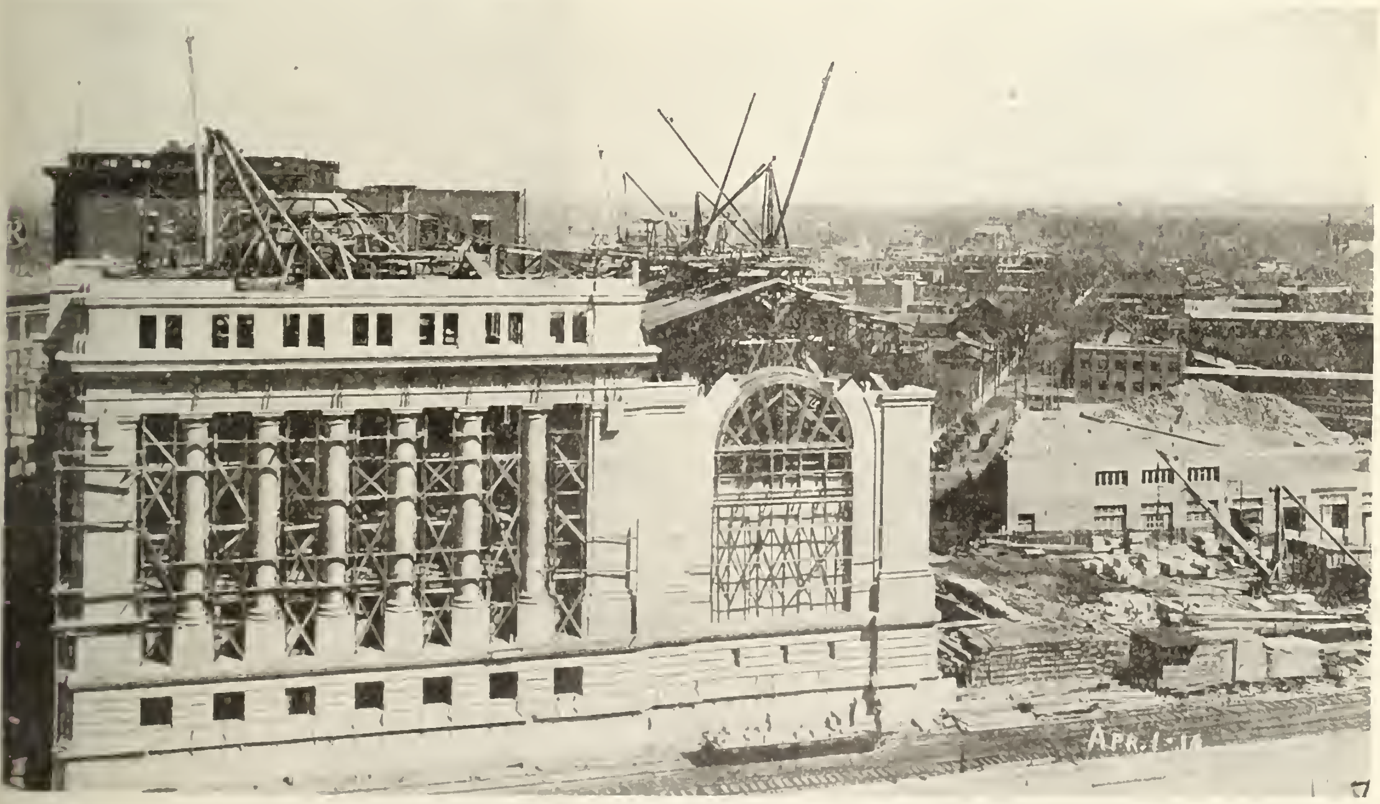
The architectural treatment of the exterior has been designed with a view of expressing nearly the function of each part of the building. The style of architecture has been chosen as being the most appropriate for a railroad terminal. The exterior is built of light buff Indiana limestone, the internal structure being of steel, concrete and terra cotta, giving fireproof results.

At the extreme eastern end of the baggage and express building a service building is provided for supplying all heat, light, steam, hot water, compressed air, refrigeration, etc., for the use of the station building and train purposes.

Dark Glaze for Sewer Pipe.—In order to obtain a dark body for sewer pipe, especially when fireclay or stoneware clays are used, it is necessary to get first the right proportion by which the clays are to be mixed. The mixture for sewer pipe must be a large range between vitrification and melting point, and this range should be at least from five to six cones so that the pipe will stand up well under fire. A finishing temperature of cone 8 is very good for salt glazing, but lower temperatures can also be used. When the pipe are burnt in a continuous kiln, the burning should be done by reducing atmosphere, or very smoky fire. Two chambers which are just finished are filled with an excess of fuel, and then closed up, so that the cooling will take place in a reducing kiln condition. If the kiln is opened too soon, the color will not be dark.—Tonind. Z. No. 76, 1911.

Saving rotted timbers of a decayed trestle has been accomplished by cutting away all the decayed wood at and above ground level and casting a solid concrete mass about the decayed part. The concrete is held in place by driving the hooked ends of vertical steel rods into the sound wood, both above and below the decayed parts, and fastening expanded metal to these from a point about 1½ ft. below ground level to a point 1 ft. above. This method is also being used by the Pittsburg Reinforcing Pole Company, of Pittsburg, Pa.

All records for rapid brickmaking were beaten in Chicago recently at the Carey Brickyard, when 354,000 common bricks were made on a stiff-mud machine, dried and set by the Penfield brick-setting system, in a period of eight hours. This is a most remarkable record and sets a high mark in brick production.



Central Union Station, Ottawa, as it appeared under construction. Architects, Messrs. Ross & MacFarlane, Montreal; contractors, Messrs. Peter Lyall & Sons, Montreal.

Canadian Contractors and Their Work

The George A. Fuller Company, Limited, and their Operations—Notable Undertakings in Montreal, Toronto and other Canadian Cities

AMONG the newer building and contracting concerns of Canada is the George A. Fuller Company, Limited, with headquarters in New York and Canadian offices in Montreal, Toronto and Winnipeg. The important undertakings now being carried out by this company are the Chateau Laurier hotel at Ottawa costing $1,500,000 and which is almost completed; the Fort Garry hotel, first christened "The Selkirk," at Winnipeg, just commenced and to be completed by March 1, 1913, at a cost of $1,500,000; the Ritz-Carlton hotel, Montreal, to cost $1,300,000 which will take a year to build, completion being due January 1, 1913; the C. P. R. Offices at Toronto which will cost a million and are to be ready for occupation by the middle of next October; the Art Gallery in Montreal costing $900,000 and which is to be ready for opening next March; and the Bowles Lunch Company, Yonge street, Toronto, also to be finished next March at a cost of $90,000.

Hotel Selkirk, Winnipeg

The Hotel Selkirk which is now being erected in Winnipeg for the G. T. P. Development Company was designed by Messrs. Ross & MacFarlane, of Montreal and Winnipeg. It will be built of Canadian granite and limestone and its style will follow that of the old French chateaus of Normandy and Touraine. It will contain three hundred and fifty bedrooms and will be absolutely fireproof throughout. The building was described in detail in the Contract Record for September 6th, 1911.

Hotel Selkirk, Winnipeg, which the Fuller Company are erecting for the G. T. P.

Chateau Laurier, Ottawa

Reference to this building will be found in another column under the particulars given in connection with the group of buildings at Ottawa and in any case several progress articles on this construction have been published in previous numbers of the Contract Record. The contract is one of the most notable of the Fuller Company's undertakings in the Canadian field and incidentally, it may be added, one of the most interesting projects of the kind in a generation.

C. P. R. Offices, Toronto

The C. P. R. Offices at the corner of King and Yonge streets, Toronto, now under construction, were designed by Messrs. Darling & Pearson, architects, Toronto. The building will be sixteen storeys high, with basement and sub-basement, of fire-proof construction and will have a frontage of 120 feet on Yonge street and 75 feet on King street.

New office building of the C. P. R. at Toronto as it will appear upon completion.

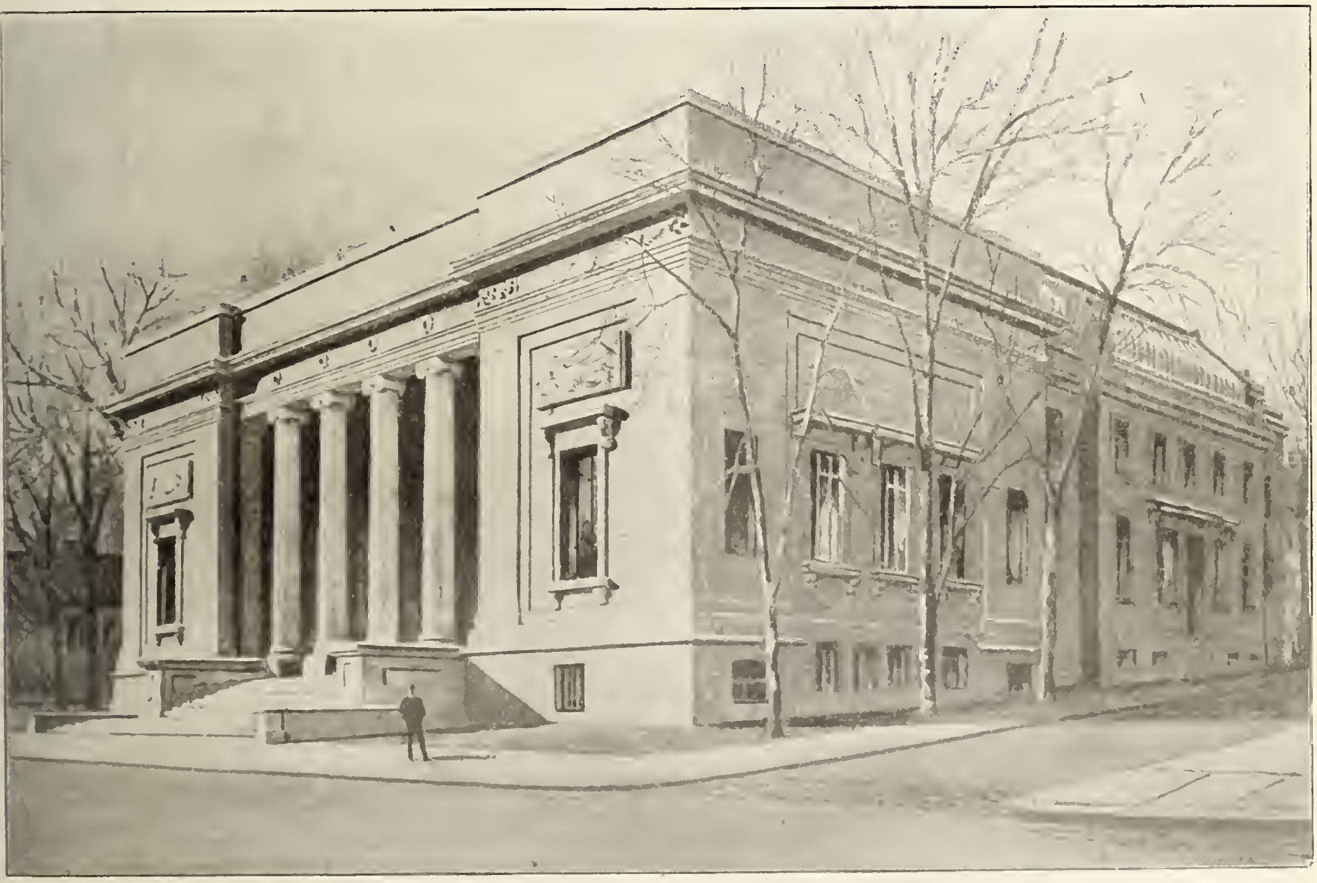
The granite base resting on concrete foundations will reach to the second floor and the exterior walls of the superstructure will be of semi-glazed terra cotta on all sides. A rather unusual feature is the fact that there will be no cornices, the roof being finished with pylons instead. A plant will be installed in the sub-basement for the generation of both steam

Operations in progress at the site of the C. P. R. office building, Toronto.

and electricity. The foundation has been sunk to bed-rock some 35 feet below the street level, concrete caissons having been employed in this connection. The foundation has been thoroughly damp-proofed.

Montreal Art Gallery

This building is situated on Sherbrooke street, Montreal, at the corner of Ontario avenue. It has concrete foundations laid on bed-rock. This is surmounted by a granite base and the entire superstructure is of Vermont marble with rubbed finish. The structure is of classic design and ornamented with carving. The principal feature is the main portico on Sherbrooke street. Here stand four fluted marble columns being monoliths, each 32 feet long and weighing 30 tons. The interior entrance hall and stairways are elaborately finished in imported marbles. The galleries are lighted through patent U-Bar skylights. These constitute a novel and pleasing feature of the building and set off the interior very effectively instead of being the eyesore that skylights usually are. The latest devices have been introduced in the equipment of the galleries for picture hanging as well as



New Art Gallery, Montreal.—Architects, Messrs. E. & W. S. Maxwell: contractors, Geo. A. Fuller Co., Ltd.

lighting. The best methods to be found in the leading galleries of Europe and America have been adopted.

The architects are Messrs. Edward and W. S. Maxwell, Beaver Hall Square, Montreal.

Ritz-Carlton Hotel, Montreal

The Ritz-Carlton hotel will be situated at the corner of Drummond and Sherbrooke streets, Montreal, occupying a site with a frontage of 180 feet on Sherbrooke street and 140 on Drummond. It will be a ten-storey structure with a basement and sub-basement going down altogether 40 feet below the Sherbrooke street level. This immense excavation entailed the removal of 17,000 cubic yards of earth and stone, more than half of which was blasted out of solid rock. Steam drills were used in connection with this work. A crusher was put in operation on the spot breaking the rock into suitable sizes for macadam and concrete work, for which it was sold to the city of Westmount, the Montreal Harbor board and various contractors.

The exterior of the building will be of Bedford limestone, with terra cotta trimmings to match, for the openings. There will be ornate terra cotta frieze and cornices, the latter with polychrome color effects. The structure will be over a steel frame, but the exterior walls will be self-supporting and not resting on the steel frame as is usual in large buildings. Another feature of the hotel will be an open court or garden space on the southwest corner of the property. A roof garden is also planned. There will be 225 rooms all provided with bath and other modern conveniences. An elaborate scheme of ventilation has been designed for the entire building. It will have its own steam heating plant and will be lighted by electricity.

Ritz-Carlton Hotel, Montreal, under construction

The architects are Warren & Wetmore, of New York, with whom is associated Mr. Kenneth G. Rea, of Montreal. The proprietor is the Hon. Lionel G. Guest.

The new parlors of the Bowles Lunch Company, although much smaller than the other undertakings will be a gem in its class. The structure will be of terra cotta exterior with polychrome treatment of the front. The interior will be of imported marble and tile finish. The contract includes a bakery for the company in a separate building in rear of 149 Yonge street.

Underpinning Brick Dwellings on Concrete Piers and Girders

The excavation for the Fourth Avenue line of the Rapid Transit Subway in Brooklyn, N.Y., is about 50 ft. deep and reaches nearly to the building line in Ashland Place, where 18 four-storey brick dwellings were underpinned by the contractor before the subway trench was excavated. In most cases each building occupies a single city lot 20 ft. wide with its front forming a continuous wall with the other buildings, with concrete or rubble masonry footings in the dry sandy soil 6 or 8 ft. below the surface. According to details of the work given by the Engineering Record, operations were commenced by removing the sidewalk and street surface at night, excavating to the bottom of the footings and covering the trench about 35 ft. wide by a plank platform on which traffic was maintained.

Needlebeams were then put under the front wall, one on each side of each party wall, supported on cribbing or sills in the cellar inside the building line. Outside the building line they were supported on the wallings and timbers of the street excavation which was carried down several feet lower while the wall was supported on the needles. The wall load was transferred to the needlebeams, thus permitting 4 x 6-ft. pits to be excavated to sub-grade of the subway under the intersection of the front and party walls. The pits were sheeted as excavated with 3 and 4-in. planks halved at the ends to interlock at the corners each course being undermined and the next lower course carefully placed as the excavation progressed. Ground water was encountered 2 to 6 ft. above the bottoms of the pits and the excavation carefully carried down through it to the required depth.

Intermediate needlebeams were set up and wedged to bearing against the wall footings between the piers and trenches were excavated from pier to pier down to the pier tops. Reinforcement rods or steel I-beams were placed in the trenches and the latter were concreted, making continuous girders 30 in. wide and about 4 to 7 ft. high, connecting the tops of the piers and having a space of 1 to 2 ft. between their upper surface and the lower portions of the brick walls. After the concrete beams were 4 to 6 days old piers were built on them between the needlebeams to within an inch or less of the lower surface of the brick wall. Under the front wall this space was grouted, but under the party walls this space was increased to 9 in. and pairs of steel wedges were driven between blue stone bearings and the new brick work to insure positive bearing as in the case of a six-storey apartment house and one or two other heavier buildings.

After the grout was about a week old the needlebeams were removed, transferring the entire weight of the wall to the reinforced concrete girders and the spaces between the piers, formerly occupied by the needlebeams, were bricked and grouted, completing the connections between the old walls and the new girders and transferring the entire loads on the latter through the piers to the ground below the bottom of the subway excavation which was subsequently made without endangering the building or producing any cracks, settlement or other injury.

Origin of Texture and Color in Brick Work

Experimental Work of a Quarter of a Century Ago and the Infinite Possibilities that it has provided the Architect.

By Charles M. Price

TO-DAY it may seem trite to say that values of the greatest aesthetic significance may be obtained in brick work, but to have said so twenty years ago would have excited the derision of every architect and builder in the land.

The idea of brick work prevailing in the Victorian era was that every effort should be spent to obtain a smooth effect of absolute evenness. Not a break should mar the wall, not a shadow or a spot of interest should be allowed to spoil its dead monotony. The bricks with accidentally burned ends, now so eagerly sought, were discarded entirely, or sold as seconds for use in drains or cellar walls. The vogue of monotonous brickwork made possible that unspeakable monstrosity of walls painted in a blinding red, with evenly spaced brick-course marked out in white line. The logical structure of the material was deliberately ignored, treated as though the builder were ashamed of his material, for even the real mortar joints were not followed in the painted parody over them, which might as well have been done on a board fence. The truly fastidious builder indulged in painting his honest red bricks a sallow yellow color, with brown joints, or if he desired a very tasteful effect, he used a weird viridian green with dead black or pure white joints overpainted.

This was not brick-work—it was a travesty, a deliberate negation of all the value of brickwork, and if it was no less stupid than many architectural fallacies obtaining at the time it was certainly more utterly hideous than most of them.

It is interesting to trace the origin of the idea of texture and variation in brickwork, which, according to current anecdote, may be attributed to Mr. Sanford White. It seems that this architect, in the early days of the firm of McKim, Mead & White, was engaged upon an adaptation of what is now popularly known as the "Harvard" style of architecture.

With his usual desire to get at the root of the matter and acquire a knowledge of the essentials of the problem in hand, he went to Cambridge to study the oldest of the buildings in the grounds of Harvard University. He naturally perceived a fact that had rested unobserved for many decades of painful brickwork, namely, that one of the most significant charms of these old buildings lay in the variegated texture of the brickwork occasioned by the random introduction of burnt or slightly discolored bricks in the wall. He subsequently amazed a brick dealer by definitely specifying and personally selecting a large percentage of the bricks for his building in hand of the sort usually thrown out as seconds.

In addition to his innovation of burnt brick, Mr. White had occasion to further enlighten and amaze those who worked in brick by his treatment of the facade of the Colony Club in New York. Here he threw all precedent to the wind, scandalizing the conservative and delighting the aesthetic by using brick, both plain and burnt, in the nature of tile or mosaic, for purely decorative purposes. The entire front of the building was laid with only the ends of the bricks showing, some in the natural red and some in burnt gray, purple or dark green, and the whole diversified with panels and sinkages. The joints were all in line, like a checkerboard, and the whole was so subversive to all established ideas of brickwork that it created a storm of controversy in the architectural press throughout the country. From the babel of approbation and condemnation finally arose the acceptance of this amazing "tour de force," and its adoption by progressive architects was as universal and as productive of happy results as the adoption of the use of burnt bricks.

With these departures from the old traditions in brick-work firmly established, it was not long before the manufacturers rendered further developments possible. The setting of regular two-inch by four-inch by eight-inch bricks in ingenious and aesthetic ways was practised in infinite variations, with the structural joints forcefully expressed and the material used frankly employed.

One manufacturer, firmly convinced that the idea of expressing texture in brick work was not an ephemeral architectural fad but a great aesthetic discovery, bent his energies to the production of various bricks which should allow the architect a wide range in color, shape and texture.

Effects from Skilful Grouping

Beginning with new shapes, wider, flatter and longer than ordinary bricks, the various shapes were cast in certain groups of soft coloring, which if properly blended in selection may, in an interior, be found to reflect the rich values of an Oriental rug, and be admirably set off by dark woodwork. These possibilities may readily be realized by a consideration of colors and shades which may be commanded from the various groups. Thus the "red group" includes not only varying shades of red, but a certain proportion of coppers, olive greens, purple, browns, and blues. The "gray group" includes various shades of brownish gray, running into cream and coffee and deep russets. The "golden group" includes shades from a soft, delicate chamois to a deep golden brown. The full range of either group may be used in a single fireplace or facade with a delicately harmonious result or the solid colors may be used for greater mass effect. In exterior treatments, blank wall spaces or the frieze under the eaves may be richly diversified with decorative panels, using colored bricks as a tile mosaic, which, though structurally bonded into the wall, will possess the value of applied faience treatment.

The way has been opened for infinite possibilities in brickbuilding, and architects are making the most of the discovery of the importance of "texture," "local color," and "incidental interest" in brick surfaces.

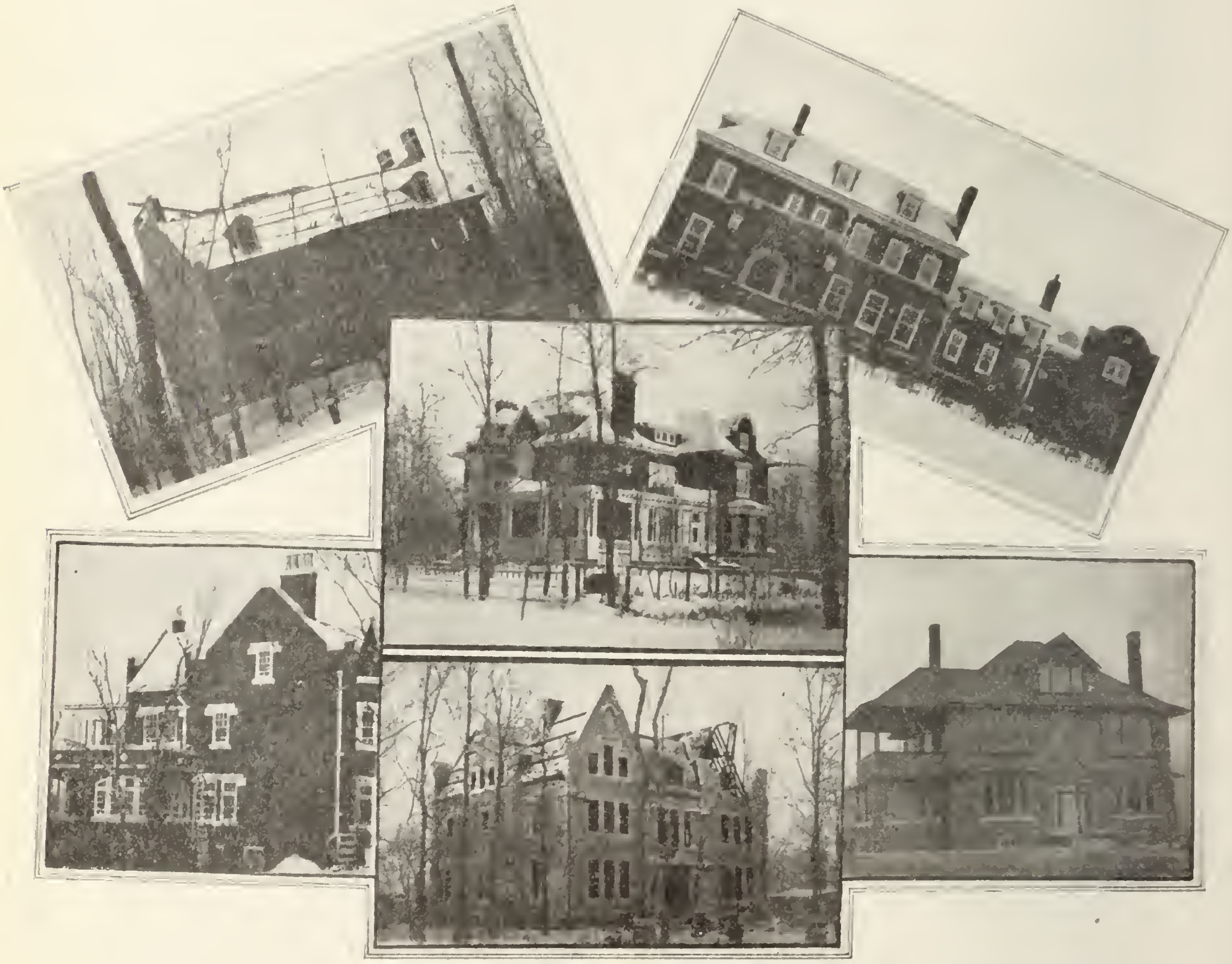
It is indeed the day of the brick, and so beautiful and interesting are the results now obtained in color and texture that it is absolutely impossible that a return to the days of stupid monotony and dead inertia in brick-building could ever be effected.

Winnipeg's Improved Homes

During the last few years the reputation of the city of Winnipeg has improved vastly. Thanks largely to the enterprise of the builder and to the faith of eastern capitalists the whole aspect of the city has changed. Winnipeg is no longer the prairie city in the sense that it is deficient in improvement and lacking in modern advantages. It has already taken its place with Montreal and Toronto, and it is not beyond the realm of possibility that it will some day surpass them.

Much has been heard from time to time concerning the important industrial buildings, banks and hotels, upon which millions of dollars have been invested in the last decade. Little, however, has been said about the improved type of residence that is being built in Winnipeg. In residential construction someone has distinguished between homes and houses. This line of distinction may be noted very clearly in the Winnipeg residences of the past and those of the present. A house may be any kind of a building that is sound in its construction and is enclosed by the necessary four walls and a roof, but a home must be properly adapted to its surroundings and possess individuality and distinction. According to this definition it is only within recent years that any great number of homes have been constructed in Winnipeg.

In the accompanying group we give a few examples of what was accomplished last season in the erection of well planned homes in Fort Rouge. Individuality and artistic treatment are outstanding features of the work, both in the design and in the selection and use of the material. The general appearance of the completed structures is improved greatly by deep lots and natural trees.



A Few Examples of the Development of Improved Residential Building at Fort Rouge, Winnipeg, Man.

Edmonton contractors will doubtless welcome the incorporation of the Pembina Quarries, Limited, which concern hopes to provide the city with building stone, the demand for which for some years has greately exceeded the supply. The company has acquired a property of 70 acres on the banks of the Pembina river and the location is reported to be the most promising quarry in central Alberta. Upon the completion of the preliminary examination and survey of their property the company intends to instal quarrying machinery and commence taking out building stone for the Edmonton market.

To find the horse-power of a vertical tubular boiler, divide the total heating surface of the tubes and fire box (expressed in square feet) by ten, and the result will be the horse-power.

Steel Sheet Piling in Contract Work

Its Advantages and Various Uses—Employed Successfully in the Construction of the New Water Intake for the City of Toronto.

STEEL sheet piling has now become such an invaluable aid to contractors in general that we believe some information about the various ways in which it is used will be of interest to our readers, particularly so in view of recent enquiries received by the Contract Record.

It is obvious to anyone who has given the subject a thought that steel sheet piling proves its value immediately over the timber which it is displacing by reason of its availability for re-use a number of times. Furthermore, its great strength demands less bracing than timber under like conditions, and the interlocking joints which connect the units together not only provide a connection which can be made absolutely watertight, but prevent separation between the units if any obstruction is encountered buried in the ground. We know of numerous jobs on which steel sheet piling has cut through submerged logs up to 42 inches in diameter, and the reason why it can do this without damage to itself is evident when it is remembered that the thickness of metal is so slight, compared with that which would be required for timber, that the pile is really nothing but a large steel chisel.

Steel sheet piling can be procured in various sizes and weights, the lighter sections being suited for driving by hand, while the heavier ones of course require a pile-driving hammer either of the drop type or of the later steam or compressed air type. Incidentally, it may be remarked that the advent of steel sheet piling has been such a stimulus to designers of steam hammers that several new ones have made their appearance within the last two years, all of which appear to be giving very good satisfaction to their users, and all of which are able to work in a much more confined space than the original types. Furthermore, the makers of the new hammers have provided for suspending them from a boom, so that in many cases pile driving can be done without using leads, as in a regular pile driver. When steel sheet piling is to be used repeatedly it is generally considered advisable to use a special cap provided with a wood cushion block between the hammer and the top of the pile, in order to prevent the latter battering up under the blows of the hammer. As in the case of the piling and of the hammers, a number of different types of caps are on the market, although very often the contractor will prefer to use a cap of his own design.

Ease of Pulling Up Steel Sheet Piling

Re-use of steel piling necessarily involves pulling the material after it has been once driven, and to anyone who has had very much to do with pulling wooden piles this feature at first sight appears to be a likely means of running up the cost of the work. It is a fact, however, that partly for the same reasons as those which make steel sheet piling drive more easily than wood, the steel piling also pulls more readily, and the operation is doubtless helped by reason of the smooth surface which the steel presents to the surrounding soil as compared with the comparatively rough surface of timber. Generally speaking, the ease or difficulty of pulling steel sheet piling go hand in hand with care or carelessness in driving; it is essential for easy pulling that the interlocking joints should be kept as nearly perpendicular as possible in both directions, otherwise the pull of the hoisting tackle is working at an angle with the line of the joint, which anyone will recognize as a great objection. After care in driving, the next most important thing to be observed is care in bracing to prevent any inward bending of the piling sufficiently to give the steel a permanent set; a slight amount of bending inward is not objectionable, as it helps to tighten the joints and is released when the earth or water pressures are equalized on both sides of the piling at the conclusion of the work. In the same manner that no one can say off-hand how much driving a pile will require unless the quality of the soil into which it is driven is accurately known, the amount of pull required for removing the piling is also usually indefinite. Light sections 12 feet long, embedded for their full length in sand, have been pulled with a hand lever six or eight feet long; heavy sections, driven for their full length of 50 feet through stones, slag, iron and steel scrap, gravel and sand, have required an uplift of about 280 tons to pull a single pile. Other records which we have seen run all the way from five tons pull for 30-foot lengths to ninety tons pull for 35-foot lengths. In general, it may be said that for lengths of steel sheet piling up to about forty feet, driven in soils not too compact, the contractor should rig sufficiently heavily to pull about fifty to sixty tons. In many cases it would be found that this figure would be excessive, but as in all other kinds of work it is best to be prepared for the worst rather than to lose time experimenting with a rig which is too light to handle the conditions, thereby causing a loss of time and labor with no useful result.

For the benefit of our readers who have not yet used steel piling, we may add that the companies who sell this material usually provide it with one or two holes about one and one-quarter inches in diameter at the top end of each piece for attaching shackles which can be connected with the hoisting blocks.

The initial cost of steel sheet piling will always be greater than that of wood, but at a time like the present when prices for steel are low the difference is less marked. This difference, however, disappears when it is possible to use the steel several times and to eventually sell it either for second-hand piling or for scrap steel, for which there is always a ready market.

Having now covered the general subject in outline, we may consider a few of the special uses for which steel sheet piling is exceedingly well adapted, and the first one which deserves a few words is probably that of temporary or permanent dams, comprising under this heading structures for river or current control, including wing dams and groynes, dams constructed for retaining water, as in the case of reservoirs, rather than regulating its flow, and cofferdams of any description. Steel sheet piling may be obtained in suitable weights to support a depth of water, varying from about four feet to about 12 feet, with the piling simply driven into the ground and with no bracing of any description, always provided that the nature of the ground is sufficiently firm to offer the requisite resistance on the downstream side of the piling. Very large tonnages of steel sheet piling have entered into the construction of core walls for large dams, particularly underground core walls, to prevent percolation of water beneath the dam and to arrest underground flow, making the latter available for service as well as that which is visible above the surface. Several dams have been constructed solely of steel sheet piling where the head of water has been within the limits given above, and these dams have withstood flood conditions which have wrecked structures of the older types. Cofferdam work has been almost revolutionized since the introduction of steel sheet piling, numerous single wall dams without puddle having been successfully used in depths of 26 to 28 feet of water, and one dam in the Chicago River on the La Salle street tunnel work having sustained without leakage a head of 53 feet of water.

A Portable Harbor

The second use which may be made of steel sheet piling is in the construction of dock or bulkhead walls and dredging contractors might well emulate the example set by one enterprising individual in the neighborhood of Chicago who purchased a quantity of steel sheet piling some years ago and who uses it constantly to form a temporary harbor protecting his equipment from the storms of Lake Michigan, the harbor being built of such shape and in such locality as the work at any time under way may require. In other words, he "carries his harbor with him."

The third use which has accounted for the installation of a large proportion of the steel sheet piling placed on the market within the last few years is that in retaining walls, whether to hold a bank of earth above the surface of the ground or to support the sides of a dredged channel below the water surface. In this connection we have in mind some work done in England within the last year or two, in which piling was driven to a submerged depth of about fifteen feet to the top of the piles in order to prevent the filling up of a channel dredged along the face of a bulkhead. The new water intake for the city of Toronto, required steel sheet piling in 18-foot lengths to be driven at the outer end of the intake to a maximum depth of about sixty feet to the top of the piles, the object of the piling in this case being to provide a side wall on each side of the intake pipe between which a concrete cover may be deposited under water for the protection of the steel pipe.

Another use which has been found for steel piling is that of the protection of cribs where it has become necessary to dredge the channel alongside of them to a greater depth than originally contemplated, the piling being driven down below water and serving to retain the material forming the foundation of the cribs.

Still a fifth use which would sometimes be found economical is in the repairing of old docks or bulkheads, these being nearly always of pile construction. In many cases very expeditious and economical repairs can be made by driving a line of steel sheet piling along the entire face of the dock, tying it back to the bearing piles which are already in place behind the dock wall and filling in with sand or other material to the level of the top of the dock, thus forming a structure which will be almost as permanent as masonry and which will at the same time be fireproof.

Another situation in which steel sheet piling has proved its value is that in which scour caused by a rapid current has to be prevented, and a further one is the use of it for open wells seven or eight feet in diameter up to a depth of fifty or sixty feet or more; in fact, it would be possible to continue the list with amplifications of detail to a point which would be wearisome to the reader.

The leading companies manufacturing steel piling to-day are the Carnegie Steel Company of Pittsburgh, Pa., the Jones & Laughlin Steel Company and the Lackawanna Steel Company. Any of these concerns, through their local agents, are always willing to give exact and accurate information pertaining to past installations of their material, as well as to the sections furnished and to delivered prices.

Several years ago reinforced concrete was tried in the form of sleepers by an English railway company, and the result was satisfactory. Now three companies—the London and Northwestern, the Great Northern, and the Great Eastern—have utilized reinforced concrete for fence posts. As is well known, creosoted wooden posts require renewing, their life not being more than some twenty years. On the other hand, reinforced concrete has a much longer life, being in fact practically imperishable, so that, even if its first cost is greater, its advantages counterbalance first economy. The cost of such posts runs out at about 13 cents a foot lineal, and in cases where cement, iron, and sand are cheap locally the cost of reinforced concrete posts is less than that of creosoted wooden ones.

Reinforced concrete slabs for screens and partitions at the North Station of the Boston Elevated Railway are made of a 1:2:4 mixture of Portland cement, granite crusher dust and small granite screenings. The slabs are reinforced with Clinton wire cloth and round rods in both directions. Dowels, projecting at the sides and ends, are cemented into the adjacent slabs by a mortar filling. The slabs are cast flat, in a sand mould, and, when firmly set, the upper surface, which is flat, is highly polished; this gives a finish, it is stated, similar to the best granite or marble. The exterior face is treated architecturally with panels and mouldings and is left in the rough, as it comes from the form with a coating of sand.

When the preparations for building the Campanile in Venice were undertaken the archaelogists were afforded an opportunity to make some interesting studies of the bricks. It was found that they had been used in arches, fortifications, the tops of walls and in other ways before they were built into the Campanile, and they were not Venetian, but Roman bricks. These ancient bricks were made in slices, for in many layers could be seen undisturbed. The bricks examined were of the first century. One of them bore the imprint of a horseshoe, which may prove that Romans used horseshoes like ours, although it is generally believed that their horseshoes were strapped on, not nailed.

A blanket of clay and gravel is being experimented with at Charleston, S. C., as a covering for smoothing the surface of Belgian black pavements. Mr. Reid Whitford reports that the test has not been under way long enough to justify conclusive results.

Manufacture of Brick and Tile in the United States

A preliminary statement of the general results of the thirteenth census relative to establishments engaged in the manufacture of brick and tile has been issued by the Bureau of the Census, Department of Commerce and Labor, Washington. It covers building, fancy and ornamental brick, vitrified brick, drain tile and any other brickyard product. The general summary shows increases in all the items at the census of 1909, as compared with that of 1904, except in number of establishments, which decreased from 4,634 to 4,125, or 9 per cent. The capital invested as reported in 1909 was $174,673,000, a gain of $54,716,000, or 46 per cent., over 119,957,000 in 1904. The average capital per establishment was approximately $41,000 in 1909 and $26,000 in 1904. The value of products was $92,776,000 in 1909 and $71,152,000 in 1904, an increase of $21,624,000, or 30 per cent. The average per establishment was approximately $22,000 in 1909 and $15,000 in 1904. The cost of materials used was $23,736,000 in 1909, as against $16,317,000 in 1904, an increase of $7,419,000, or 45 per cent. The value added by manufacture was $69,040,000 in 1909 and $54,835,000 in 1904, an increase of $14,205,000, or 26 per cent. This item formed 74 per cent. of the total value of products in 1909 and 77 per cent. in 1904. The miscellaneous expenses amounted to $9,431,000 in 1909 and $6,969,000 in 1904, an increase of $2,462,000, or 35 per cent. The salaries and wages amounted to $42,578,000 in 1909 and $32,176,000 in 1904, an increase of $10.402,000, or 32 per cent. The number of salaried officials and clerks was 4,951 in 1909 and 3,690 in 1904, an increase of 34 per cent; their salaries increased from $3,530,000 in 1904 to $5,439,000 in 1909, or 54 per cent. The average number of wage earners employed during the year was 76,528 in 1909 and 66,021 in 1904, an increase of 16 per cent; their wages increased from $28,646,000 in 1904 to $37,139,000 in 1909, or 30 per cent.

Municipal Work at Brantford, Ont.

Mr. T. Harry Jones, City Engineer of Brantford, Ont.

According to the report of Mr. T. Harry Jones, city engineer of Brantford, Ont., the expenditure of the engineering department of that city during 1911 totalled $144,023. In addition to a considerable quantity of street work, 482 house connections were made, this representing a length of more than three and one-half miles. Sanitary sewers to the number of 47 were constructed, the total length being about seven miles—double that of 1910—and the cost $50,464. Nearly 4,000 lineal feet of storm sewers were laid at a cost of $6,392. Seven and one-half miles of concrete sidewalks were put down as local improvements at a cost of $21,497. The year witnessed the completion of the Market Street bridge, which has already been described in detail in the Contract Record. Bitulithic pavement, including brick in the street railway portion, was laid at a cost of $5,274.

Activity at New Westminster, B.C.

City Engineer Blackman, of New Westminster, B.C.

At New Westminster, B. C., during 1911, a considerable amount of work was carried out under the supervision of Mr. J. W. B. Blackman, the city engineer. The value of the contract work started or completed during the year was $374,676. In addition a considerable amount of work on streets and sewers was performed by day labor. During the year nearly nine miles of wooden sidewalks were laid, and 95 culverts were constructed at street intersections, totalling 5,953 feet, or 1.11 miles. Nearly three and one-half miles of box drains were constructed. The 8th street sewerage system was completed and the easterly portion of the west end sewer started. It is of interest to note that two years ago New Westminster had constructed only 9.35 miles of sewers. At the end of 1910 there were 15.85 miles laid and at the close of last year there were 46.71 miles laid and under construction. The Sapperton sewerage system, which will be well under way by the end of 1912, will add forty-five miles to this total and an additional fourteen miles will be added by the scheme for sewering that portion of the city lying west of 14th Street.

The Lightning Furnace Company, Limited, of Montreal, have almost completed their foundry at St. Johns, Que., and expect to be ready to start manufacturing early in February. The president of the company is Mr. Romeo Houle and the secretary-treasurer Mr. E. Rodier. The head office is at 204 St. James street, Montreal. The company was recently re-organized and will be one of the leading industries of the thriving town in which its works are situated. The foundry will employ about fifty hands at the outset and will manufacture heating furnaces, cooking stoves, etc. The floor area, with the recently erected additions, will cover several thousand square feet and all the equipment will be of the most modern character both for making and handling the product. There is an artesian well on the property.

Good Report from London Builders' Exchange

Excellent reports were presented at the 14th annual meeting of the London Builders' Exchange, for particulars of which we are indebted to the secretary, Mr. Geo. S. Gould.

The financial statement showed that the receipts of the Exchange were greater in 1911 than in any previous year. The report on the year's work was presented by the retiring president, Mr. John Jones, who referred, among other matters, to the important part taken by the Exchange in establishing technical night schools. Mr. Jones dealt at some length with the general work of the Exchange during the year. Several important matters would have to be taken up by the new Board. These were the Workmen's Compensation Act, the Mechanics' Lien Law and the formation of a Provincial Association.

The following officers were elected for the current year: President, Mr. William Nutkins; vice-president, Mr. E. R. Dennis; second vice-president, Mr. L. H. Martyn; recording secretary, Mr. A. C. Nobbs; secretary-treasurer, Mr. George S. Gould; Board of directors, Messrs. John Moran, H. Hayman, George H. Belton, Thomas R. Wright, Ben. Noble. Delegates to the Canadian National Association of Builders' Exchanges: Messrs. E. R. Dennis, district organizer; Wm. Nutkins, George S. Gould and L. H. Martyn. Exchange auditors and representatives to Weston Fair Board, Messrs. Donald Ferguson and Ed. Gerry. Chairman of entertainment committee, Mr. E. R. Dennis.

Mr. George S. Gould, Secretary. Mr. William Nutkins, the new President. Mr. John Jones, retiring President.

OFFICERS OF THE LONDON BUILDERS' EXCHANGE.

Arrangements are in progress for the annual banquet of the Exchange, which will be held at an early date.

Calgary Builders' Exchange Annual Meeting

At the annual meeting of the Calgary Builders' Exchange held last week, Mr. T. W. Aldridge was elected president; Mr. G. Silvester, vice-president; Mr. W. J. Richards, 2nd vice-president; Mr. J. H. Garden, 3rd vice-president, and Mr. Jas Marr, sergeant-at-arms. The directors elected were: Messrs. P. S. Woodhall, R. A. Brocklebank, Robert Macfarlane, J. M. O'Rourke, Thos. Tucker and J. Priestly.

The annual report was presented by the president and adopted unanimously. A hearty vote of thanks was extended to the president for his untiring energies.

A sum of $340 was subscribed at the meeting towards the expenses of ten delegates to the forthcoming Toronto Convention of the Canadian National Association of Builders.

A committee of the Alberta Architects' Association consisting of Messrs. G. M. Lang and J. A. MacDonald were present and addressed the meeting with reference to the formation of an arbitration board to settle differences between architects and contractors. It was pointed out that such a board would be conducive to amicable settlements, but that it would not be legally constituted unless appointed by a Judge of the Supreme Court.

The following new members were elected: Mr. N. Sullivan, general contractor; Messrs. Kennedy & Good, plumbing and heating contractors; Mr. David Richards, builder and contractor, and Messrs. Scott & Pettie, plastering contractors.

Quebec Architects' Annual Meeting

The members of the Province of Quebec Association of Architects held their annual meeting on Saturday, Jan. 13, at the City Hall, Quebec.

In the report it was stated that a competition for photos had been approved by the council and prizes of $50 offered for the best six photos of old buildings of architectural interest in the province. The committee asked the Montreal City Council to appoint a committee of experts to study the question of a civic centre or that an open competition be held in order that a dignified scheme be drawn up, not only covering present requirements but also admitting of a reference to future needs. The sum of $875 had been promised towards the creation of a travelling scholarship for the province. The Dominion Institute had recently suggested to the Federal Government the giving of an annual grant to establish an architectural travelling scholarship, and the incoming committee might consider whether a competition open to all students from all parts of the Dominion would create a far keener interest, and therefore better results, than any purely provincial scholarship.

The report was adopted, and the question discussed as to whether the association should bring before the Government the subject of making it illegal for men who were not members of the association to practice architecture. At present men may practice architecture provided they do not use the title of architect. The question was referred to the new council to take immediate action.

The general principle of a uniform contract with builders was endorsed, but certain details were referred back to the committee dealing with the subject with instructions to report to a special meeting of the association.

The following officers were elected for the ensuing year: President, J. Venne, Montreal; first vice-president, J. P. E. Dussault, Quebec; second vice-president, W. S. Maxwell, Montreal; secretary, J. E. Vanier, Montreal; treasurer, Hugh Vallance. Council: G. A. Monette, Montreal; J. Perrault, Montreal; K. Rae, Montreal; S. Haskell, Montreal; P. Levesque, Quebec, and Rawson Gardiner, Montreal.

In the evening Mr. Venne presided over the banquet. Those who spoke at this function included: Messrs. John Archibald, Montreal, who responded to the toast of "The Province of Quebec;" E. T. Nesbitt, president of The Canadian National Association of Builders; Rene P. Lemay, and S. Haskell.

Traffic Routes in Montreal

In an address before the Province of Quebec Association of Architects, Montreal, on Jan. 16, Mr. F. G. Todd spoke on improvements to traffic routes in Montreal. He dealt briefly with town planning under three heads:—traffic routes or the consideration of the city's transportation system, the park system, and the local streets and playgrounds which might be required for the use of the business and residential sections. Of these the most important—the greatest consideration in any town planning—was that of traffic routes. It was obvious that a city which was laid out in such a manner as to provide for the most economical handling of trade was the city which was going to grow at the expense of the other, and this economical handling meant a good transportation system. Competition in business was so keen that it paid to spend vast sums of money in improving the transportation within a factory, even for the sake of saving only a fraction of a second in some of the many processes. Roughly speaking, the ideal arrangement for the ordinary seaport town was to have one set of thoroughfares running parallel with the water front, another extending at right angles to these, and a third, but less numerous set, consisting of radial streets, extending outward from the centre like the ribs of a fan. This latter system might also include cross radials between important centres.

The general opinion of experts was that no important traffic thoroughfare should be laid out less than 80 feet in width. This provided for ample sidewalks and a roadway from 54 to 56 feet in width, which was also sufficient for fast moving traffic to pass the slow traffic coming on each direction without passing over the car tracks in the centre of the street. The least space that could be allowed for such a thoroughfare was 74 to 76 feet, having regard to the free circulation of the traffic, ample space for sidewalks, and the increasing use of motor-cars. The standard of their streets was 66 feet, but what magic there was in that figure was not easily imagined except that it was the length of a surveying chain and therefore was easily remembered and easily laid out. It was, however, not a good width for a street under present traffic conditions; it was not wide enough for a main thoroughfare and much too wide for the ordinary local street.

Mr. Todd discussed in detail a plan for improving thoroughfares in Montreal, and suggested several good traffic routes.

Mr. Hugh W. Glassford, manager of the Rockwood Sprinkler Company of Canada, Montreal, died suddenly on Wednesday, Jan. 17.

Engineering Society U. of T.

The 23rd annual dinner of the Engineering Society of the University of Toronto was held on Thursday evening, January 18, 1912, in Convocation Hall. The attendance was a most representative one and the function was generally conceded to be one of the best in the history of the Society. Among those noted at the head tables were Dr. Hastings, Dean Galbraith, Dean Fernow, City Engineer Rust, Professor Haultain, and Messrs. W. A. McLean (Provincial Highways Engineer), M. J. Patton, representing the Conservation Commission, P. W. Sothman, Chief Engineer of the Hydro-Electric Commission, W. F. Tye, etc.

In an interesting speech Mr. Patton dealt at some length with the increasing use of peat and the manner in which it promised to supplant coal as fuel. Mr. Patton afterwards passed to the subject of the country's fire loss, which last year totalled no less than $21,000,000. This loss he attributed to unsound building construction, defective by-laws and inadequate inspection. Mr. Patton suggested that the responsibility should be assumed by the provinces and that Departments of Municipal Affairs should be established so as to provide a central authority for relieving the problems of the cities.

Mr. W F. Tye emphasized the importance of accuracy in every detail of engineering work.

Asbestos and its Uses

Mr. James R. Pearson, managing director of the Asbestos and Asbestic Company, Limited, of Asbestos, Quebec, read a paper before the Mining Section of the Canadian Society of Civil Engineers, Montreal, on January 11th. Mr. Pearson commenced his paper with a definition of the word and a description of the chief characteristics of asbestos. The analysis of the best quality for commercial purposes was given as follows:

Silica	40
Magnesia	42
Ferrous Oxide	3
Alumina	1
Water	14
	100

Asbestos of this consistency contained fibres capable of being spun into material containing the qualities of flexibility, silkiness and strength. Canadian Chrysotile, a form of the serpentine class of asbestos was composed of not less than 13 per cent of water. Eighty per cent. of the world's production of commercial asbestos is supplied from Canadian deposits. Russia is the next largest producer.

The largest developed deposits in Canada, Mr. Peasson stated, are situated near Danville in the County of Richmond, Quebec, and on the line of the G.T.R. Other deposits are found, and are being operated, at Thetford Mines, Black Lake, Robertson, and East Broughton in Megantic County. These are on the Quebec Central Railway and were discovered in 1877. The total shipments of asbestos from Canadian mines for the year ending December 31, 1910, was 80,000 tons valued at $2,500,000.

Mr. Pearson described the serpentine formation of asbestos in which the veins of mineral intersect the rock in all directions. The fibres lie at right angles to the walls of the veins and vary in length from 2½ inches to ⅛ of an inch or less.

The asbestos in the vein has a marked, wavy lustre or greenish tint, but when the silky fibres are separated they become a pure white. Asbestos is worked in open quarries—not mined. The rock has to be removed, so quarrying is the cheapest method. Quarries are usually from 1,000 to 1,500 feet long and from 300 to 400 feet wide.

Some are 200 feet deep. The depth of deposits has not been determined. Quantities have been found four hundred feet below the surface. Rock drills operated by compressed air are used for drilling, and quarrying is carried on in series of benches or terraces. Holes are drilled from 8 to 15 feet deep, filled with dynamite, and exploded by electricity. Some of the larger pieces of rock are blasted until they become small enough to be sorted by hand. The long fibre is separated from the rock by hand and the short by machinery. The value of the fibre depends on its length, the longer being the better. The mills are usually run by electricity. After the asbestos has been abstracted the dead rock is crushed for macadam or concrete work.

Mr. Pearson next described the methods of separating, cleaning, fiberizing and otherwise preparing the fibres for their various uses. For cleaning and sorting, screens and suction fans are employed. Much rock has to be handled for the small amount of asbestos obtained. Nearly 60 per cent. of the total production has a value under $25 per ton. The particular drawback to open quarrying is that it cannot be done profitably in cold or stormy weather.

Although asbestos was known in Pliny's time, it is only within the last twenty years that it has become an important factor in engineering and industrial construction. It is now used for super-heated steam transmission and re-heating; for theatre curtains; and it is one of the best known filters. It has made wonderful electrolytic processes possible. Gloves and garments are made of this material for the use of men employed around electrical furnaces. Owing to its frictional properties it is used to line brakes, particularly in elevators and automobiles, being immune in water and oil. It also withstands heat caused by friction. Asbestos is largely employed in combination with cement in the manufacture of felt paper for roofing, for shingles, and in stucco work; in electrical trade, for switch-boards, cables insulations and armatures. It is also used in glass factories where tools that can withstand heat are requried.

Winnipeg's Mayor on Good Roads

At a meeting in Winnipeg last week His Worship Mayor Waugh delivered an interesting address on the subject of Good Roads. Mr. Waugh said that progressive legislation pertaining to this field would be introduced at the next session of the Legislature. Every citizen should interest himself in working for good rural roads. In the neighborhood of Winnipeg there was the best land in the world, and while it was lying idle the people of Winnipeg were forced to buy largely from Ontario and the United States. The money so expended should go to build up the trade of the province.

The municipalities of Manitoba were spending $750,000 a year on what was called "road work." To his mind, not one mile of the work done was made permanent road. Mud roads were being made instead of permanent roads, in spite of the fact that good object lessons had been given. The money was not being spent in a proper manner, because there was no system and no good machinery. The municipality of Kildonan had recently laid a fine piece of gravel road at very moderate cost, and the municipalities of St. Vital, St. Andrews and Assiniboine were now alive to the question. Other municipalities were also beginning to wake up to the importance of the question. He hoped that in a few years the rural highways of Manitoba would compare favorably with those of any province or state in America.

A roadway was now being opened between the city of Winnipeg and the Gulf of Mexico. As a matter of fact only 30 miles of that highway remained to be constructed. A Canadian road from Winnipeg to the Pacific was also being constructed.

Good Roads in Quebec

Before the Provincial Government of Quebec last week, Hon. Mr. Taschereau, Minister of Public Works, outlined the system of public highways upon which it is proposed to guarantee a loan of $10,000,000, which sum will be available for the towns and municipalities of the province, on payment of half the interest rate of two per cent. The minister stated that the project included the macadamizing of four highways between Montreal and Quebec, two on the north and two on the south shore, of a highway from Quebec to the United States boundary by way of Sherbrooke and Beauce County, of a highway from Quebec to Gaspe, and of a highway from Quebec to Tadousac. Mr. Taschereau added that they contemplated a macadamized roadway from Montreal to Sherbrooke, one from Montreal to Ottawa, and another roadway from Montreal to the American border. The $10,000,000 which was to be placed at the disposal of municipalities of the province would enable them to construct 3300 miles of roads.

C. P. R. to Spend Twenty Millions in the West

The sum of $20,000,000 is to be spent by the C. P. R. this year on lines west of the Great Lakes. Mr. George Bury, vice-president and general manager of the western lines, has been in Montreal, and has had a conference with Sir T. Shaughnessy, at which details of the expenditure were arranged. Plans to lay a second track between Regina and Chaplin, Sask., between Hammond, B. C., and Vancouver, and also between Alyth and Sunalta, in the Province of Alberta, have been approved. In order to obviate congestion, considerable extensions are to be made to the terminal facilities at Vancouver, Calgary, Swift Current, Moose Jaw, Outlook, Regina, Broadview, Brandon, and Fort William, while a new terminal will be built during the coming summer at Coquitlam, B. C.

With regard to the already extensive terminal facilities at Winnipeg, two alternative surveys are now under way, one of them looking to a possible cut off from Reaburn; a new terminal will also be built so that freight trains will not have to pass through the city as is at present the case. A coal handling plant at Fort William will be constructed, and new freight sheds, steel dock and increased elevator capacity are to be given the same port.

Several branch lines are to be built. An extension of something like one hundred miles will be made from Viceroy, Sask., to the Weyburn line, and a start will also be made on the same line through the Province of Alberta, and probably at least twenty-five miles will be built in that province.

Eighty-five miles will be added to the line northwest of Swift Current, while construction will be started from a point on the main line west of Medicine Hat in a southwesterly direction. Some four hundred and seventy miles of lighter steel will be replaced by eighty-pound rails, and the estimates approved by Sir Thomas Shaughnessy include some signalling between Winnipeg and Fort William and also at Calgary, Alberta.

The Pierson U-Bar Company, 10 Phillips Place, Montreal, have just completed the erection of a conservatory for Lord Strathcona, the Canadian High Commissioner, at his Montreal residence, Dorchester street, which is claimed to be the finest structure of its kind in Canada and possibly in America. The business of the company consists of the construction of conservatories and skylights of the U-Bar type. They recently put their skylights in the Montreal Art Gallery, described in another column, and have been awarded the contract for similar lights for the operating room in the new wing of the Montreal General Hospital.

Tests on Reinforced Concrete Work at Saskatoon

Saskatoon, January 10th, 1912.

Editor Contract Record & Engineering Review:

On or about October 15 last, the Building Inspector of Saskatoon ordered work stopped on two buildings known as the Willoughby and the Willoughby-Sumner blocks, on the ground that the reinforced concrete structure was not sufficiently strong,—for some unstated reason, either workmanship, materials or design. Work was suspended for about three weeks and then resumed, the Building Inspector having withdrawn his objection. In the meantime the report spread that the buildings were unsafe. The writer, who happened to be away at the time, heard of it in Winnipeg and St. Paul. The work was in charge of the Forest City Paving & Construction Company, and the architect was Mr. W. W. LaChance, of Saskatoon. The reinforced concrete was designed by the writer, using twisted and round bars and following the specifications of the American Society of Civil Engineers. When the writer returned to Saskatoon he found that Mr. B. V. Hole, general manager of The Forest City Company, had secured the services of Mr. W. R. Harris, C.E., M. Am. Soc. C.E., to superintend the making of tests on the buildings, that tests had already been made on the Willoughby building and that these had proved satisfactory. Soon after, tests were also made on the Willoughby-Sumner building, which also proved satisfactory. We enclose herewith a copy of the report by W. R. Harris, C.E., on these tests.

Yours very truly,
Forest City Paving & Construction Company,
E. W. Hyde, Jr.,
Manager Saskatoon Branch.

Saskatoon, Sask., Dec. 6, 1911.

Forest City Paving & Construction Company,
Gentlemen:—

I desire to report as follows, regarding examination and tests of two concrete buildings being construted by you in this city:

On October 31st I examined the concrete and supervised the test loading of beams and floor slabs in the Willoughby building and found the concrete hard and sound.

Floor slabs and beams were subjected to a test load equal to two and one-half times the estimated safe live load of seventy pounds per square foot, with a maximum deflection of one-eighth inch.

This deflection was normal and the examination and tests indicate that the structure is fully capable of serving the purpose for which it was designed and constructed.

On November 3rd the Willoughby-Sumner building was examined and tested, and in general the concrete was found to be hard and sound.

It was apparent that the concrete in this building was gaining additional strength with age as is to be expected of concrete properly made.

All floor slabs and beams tested, except one, showed a normal deflection of one-eighth inch.

The one exception was a beam through which four electric conduits passed. The deflection on this beam was one-quarter inch with a development of small cracks in tension side of beam.

This beam was not tested to destruction nor was permanent injury caused same by the test.

This building is capable of carrying the loads for which it was designed.

The first, second and third floors of the Willoughby building and the first and second floors of the Willoughby-Sumner building were tested; the remainder of the floors were not tested because a sufficient time had not elapsed since the floors were poured to justify such a severe test loading.

Yours very truly,
(Signed) W. H. HARRIS.

The substructure of the high level bridge being constructed by the Canadian Pacific over the river Saskatchewan from Strathcona to Edmonton is now completed. This concrete work, comprising six large piers and several small structures and abutments, was built by Messrs. John Gunn & Sons. The steel work for the double decker bridge is already on the ground, and it is quite likely that trains will be running over the Saskatchewan from the University town to the capital some time during the coming summer. The Parliament buildings at Edmonton, which have been built by the same firm, are so far completed that the coming session will be held within their walls.

Personal News and Notes

The city of Prince Rupert, B. C., expended during 1911 over a quarter of a million dollars in new buildings.

Mr. W. D. Van Siclen, a well known Seattle architect, has opened an office at 616 Sayward Building, Victoria, B.C.

The building expenditure at Maisonneuve, Que., last year was two and a quarter millions, compared with $1,400,000 in 1910.

At Victoria, B.C., last week, occurred the death of Mr. Geo. C. Mesher, a well known pioneer architect of Victoria and a native of Brompton, England. He was born in 1831.

Mr. J. T. Child, city engineer of Calgary, recommends extensive improvements to the waterworks system and the installation of a filtration plant, the whole representing a total expenditure of $450,000.

Among the big work planned at Hamilton, Ont., is an extension to the factory of the Oliver Chilled Plow Works. The expenditure is placed at $200,000. Tenders will be called within a few days.

Mr. A. McNichol, General Manager, and Mr. C. G. Toms, C.E., of the Tomson Construction Company, have returned from New York where they have been, tendering on important concrete work.

Mr. Joseph Fels, advocate of the single tax, will address the members of the Montreal Builders' Exchange on Wednesday, January 24. Mr. Fels' remarks will be specially directed to builders, architects, and landowners.

Financial arrangements have been completed for the proposed new dry dock at Esquimalt, B.C., estimated to cost $3,000,000. The B. C. Marine Railway, 2214 Pender street, Vancouver, are the principals behind the project.

At Halifax, N.S., last week a fire occurred in a structure occupied by the Nova Scotia Construction Company, who have a one-million-dollar contract for the Intercolonial terminals in that city. The damage is reported slight.

Mr. G. Janin, City Engineer of Montreal, has been instructed by the Board of Control to prepare plans and submit estimates of the cost of constructing two subways under the C. P. R., one on St. Hubert street and the other on Papineau avenue.

Mr. W. T. Daniels has been appointed city engineer of Moose Jaw at a salary of $3,000 a year. Mr. Daniels will act under the instructions of Mr. L. W. Rundlett, whose appointment as Engineering Commissioner was noted in the last issue of the Contract Record.

At Vancouver plans are progressing for the formation of a new Builders' Exchange along the lines of similar bodies in Montreal, Toronto and Winnipeg. The entrance fee proposed is $25 and the monthly dues $3. Mr. W. H. B. Egan, 1404 Dominion Trust Building, is acting as organizer.

A number of big projects are on the tapis at Montreal. Harbor improvements estimated to cost $2,000,000 are planned by the Harbor Commissioners (Secretary. D. Seath, 57 Common street), an office building estimated to cost one-quarter of a million dollars is to be built by the Sauvegarde Insurance Company and an annex to the court house involving a similar sum will be commenced in the spring by the Provincial Government.

Mr. Geo. Clark, city engineer of Saskatoon, has returned home after an extended trip to the East. In Montreal he attended the annual convention of the Public Health Association and read a paper on the subject of water filtration. He afterwards visited Toronto, Chicago and St. Paul.

In the competition for a design for the new library to be erected at Calgary, Alta., Messrs. Reid & McAlpine, of Moose Jaw, were the successful architects. The first prize of $100 was awarded to them and the second prize of $50 to Messrs. Storey & Van Egmond, of Regina. The accepted plans entail an expenditure of $50,000.

At the annual meeting of the Laprairie Brick Company, Limited, held in Montreal, the following directors were elected for the ensuing year: Messrs. J. W. McKergow, president; Peter Lyall, vice-president; J. N. Greenshields, C. G. Greenshields, William Lyall, A. J. Corner and A. A. Ayer. The National Brick Company's interests are now in control of the Laprairie Company.

An extensive programme for 1912 has been mapped out for the city engineering department at Edmonton, Alta. The total estimates amount to $4,571,945. The principal expenditures are, water and sewer construction, $986,000; roadways, $950,000; street railway extensions and equipment, $608,000; telephone department, $324,000; waterworks department, $305,000; power plant, $221,000.

Mr. E. L. Cousins has been appointed engineer of the Toronto Harbor Commission and will resign his position in the Works Department on February 1. The Commissioners will request the Dominion Government to authorize Mr. J. J. Sing, Government Engineer at Toronto, to cooperate with Mr. Cousins in the preparation of plans for the development of the harbor at Toronto.

It is understood that Dr. McCullough and City Engineer Ker, of Ottawa, who have been making extensive investigations of water purification plants in the United States, will recommend mechanical filtration for the water supply of the Federal Capital. The cities visited by Messrs. McCullough and Ker include Philadelphia, Washington, Columbus, Cincinnati, Louisville and New Orleans. A report will shortly be submitted to the Ottawa Water Commission.

The Edmonton building total for 1911 shows an appreciable increase over that for 1910, the figures being respectively $3,672,260 and $2,159,106. The building inspector, Mr. MacIver, anticipates a season of exceptional activity during 1912. He considers that the prospects are brighter than at any previous time in the history of Edmonton. Plans are under way for the erection of a number of important commercial and industrial buildings, while there promises to be a great increase in the number of residences erected.

Owing to increased business in the west, the Garlock Packing Company, of Hamilton, Ont., have opened up branches in Winnipeg and Vancouver, where a complete stock of Garlock packings and mill supplies will be carried. The Winnipeg branch is located at 117 Market street, with Mr. W. J. Usher as Western Manager. Associated with Mr. Usher are Messrs. B. E. Dalzell and E. C. Medland. The Vancouver branch is under the management of Mr. Arthur R. Bell, who will be assisted by Mr. George Cook.

Instructions have been given by the G. T. P. to Foley, Welch & Stewart that the main line from Tete Juan Cache to Fort George must be finished by next fall. Sub-contracts have been awarded as follows: H. B. Carleton & Company, Edmonton, 25 miles west from the Cache; Burns, Jordan & Company, of Spokane, 50 miles; Sims Bros. & Peary of St. Paul, 75 miles. There are still uniet to sub-contractors an intermediate gap of 30 miles. Supplies are now being rushed in by various sub-contractors who will be hard at work in six weeks.

Messrs. John Burns & Son, Nelson, B.C., are doing a good business in the interior of British Columbia. Last year the value of their work amounted to $160,000. Recently they were the successful tenderers for the new Provincial Court House at Vernon, B.C., which is to be erected at a cost of $175,000. This firm has a complete equipment of teams, outfits for rock and cement work, concrete mixer, steam derricks and other machinery. About 100 men are employed. An important branch of their business is the sash and door factory. During the past year the firm was engaged in a great deal of important work. The contracts carried out included the Trail School, the Kalso courthouse, improvements to the Nelson postoffice, work on the new C. P. R. tourist hotel at Balfour, additions to the Rossland courthouse, and a quantity of cement work.

Mr. John H. Guess, who has just been appointed purchasing agent of the Grand Trunk Railway, was born near Raleigh, N. C., on February 5th, 1878, and entered the railroad service as a telegraph operator on the Seaboard Air Line Railroad. From May, 1900, to the following February he was clerk to Vice-president and General Manager St. John, of the Seaboard Air Line and was then appointed clerk to the vice-president and general manager of the A. B. & A. railroad, a position he held until March, 1902. From that date until September, 1905, Mr. Guess was assistant general purchasing agent, and in the latter year he was also made assistant secretary and assistant treasurer of the National Railroad of Mexico. In September of 1905 he was appointed purchasing agent of the National Railroad of Mexico and National Railways of Mexico, leaving in September, 1910, to become connected with the Grand Trunk Railway System as assistant general purchasing agent. On January 1st last he was appointed general purchasing agent.

Million-Dollar Cement Plant for Vancouver

The Portland Cement Construction Company, registered in Canada, have let the contract for the immediate construction of a huge cement plant on Tod Inlet, Vancouver Island. The work of excavating for the industry is now under way and it is expected that the work on the upper structure will be started as soon as the weather moderates. It is stated on good authority that the cost of the proposed plant will approximate very closely $1,000,000.

The enterprise has been under consideration for some time but not until quite recently were the plans for the work accepted and signed. The McAlpine, Robertson Construction Company, with offices in the Metropolitan Building, have the contract for the work. This concern is a branch of Messrs. Robert McAlpine & Sons, of Glasgow and London.

The Portland Cement Construction Company is a branch of the Associated Portland Cement Companies of London. The Portland Cement Construction Company is in control of all of the London company's affairs in Canada and is rated as one of the largest producers of cement in the world.

This new plant, which is to be built at Tod Inlet, will complete a series of plants from the Atlantic Ocean to the Pacific. It is to be equipped in the most modern way and is to have facilities for handling an immense coast and eastern trade.

At Tod Inlet there is now in operation the Vancouver Island Portland Cement Works. The new plant is to be put up on a site directly across Saanich Inlet and opposite the cement works now in operation. So far as is known the new plant is not to have any connection whatever with the one now running.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Bassano, Alta.

Engineer Mailhot is preparing estimates for installation of water and sewer systems.

Clinton, Ont.

Mayor B. J. Gibbing and the new council will discuss expenditure of $4,000 on pavements on several streets. The by-law for good roads was carried.

Kelowna, B.C.

The ratepayers carried by-laws providing $5,000 for water and light services and $13,000 for sewerage.

Port Stanley, Ont.

Contemplated installation of waterworks to cost $18.000 for Corporation of Port Stanley, Reeve Taylor. Engineer Bell. St. Thomas, has estimated cost as above. It is proposed to erect a stand pipe on the Heights at Invererie, operating system as much as possible by hydro-power.

Saskatoon, Sask.

Tenders are called until Feb. 16 for construction of about 125,750 sq. yds. of pavements. Specifications etc. with city engineer, Geo. T. Clark. City Commissioners, James Clinkskill, W. B. Neill, E. M. Snell.

Tenders are called for construction of about 621,200 sq. ft. of concrete walk and 100,950 lin. ft. curbing. Information from city engineer. Received by City Commissioners until noon, Feb. 18th. City Commissioners, James Clinkskill, W. B. Neil, E. M. Snell. City engineer, Geo. T. Clark.

Vancouver, B.C.

A report has been adopted for new sewerage scheme to cost $500,000, for Corporation of Vancouver, South Vancouver, Point Grey. Two sewers emptying into False Creek and English Bay with smaller sewers. another from China Creek emptying into Burrard Inlet, etc. Total area to be drained, 100 square miles. Plans will probably be drawn early this year.

Winnipeg, Man.

The Council of St. Andrews municipality contemplates an expenditure of over $100,000 on roads. A by-law will be submitted to the people at an early date, and it is believed it will meet with almost unanimous approval. In addition it is proposed to inaugurate, with the assistance of the local government, a progressive drainage policy. Councillor McRae and Reeve Saunders are in favor.

CONTRACTS AWARDED

Point Grey, B.C.

Sewer, West Boulevard. Municipal Clerk, H. Floyd, Kerrisdale; engineer, Cleveland & Cameron. 506 Winch Bldg., Vancouver. Contractors, MacAdam & Co., vitrified brick, 739 Hastings W., Vancouver, $27,412. Bid on cement concrete was $24,553.

Railways, Bridges and Wharves

Bassano, Alta.

E. Mailhot, Civil Engineer, has finished taking measurements for cuts and fills in location of boulevard planned through Berkeley Heights, residential district to junction of river and Crewley Valley. The street car line will also be extended to Bow River.

Calgary, Alta.

The by-law making provision for location of C. P. R. shops carried by a large majority.

Tenders are called for supply of material and construction of steel bridge across Bow River, 30 ft. w., 3 spans of 150 ft. each on concrete substructure. Plans, etc., at office of City Engineer. Received by City Clerk until noon, Feb. 10th. City Engineer, J. T. Child.

Cap St. Ignace, Que.

Tenders are called for construction of wharf. Plans. etc., at Department and at offices of A. R. Decary, P. O. Bldg., Quebec; J. L. Mihaud, Merchants' Bank Bldg., St. James street, Montreal, and on application to local postmaster. Received by Secretary until 4 p.m., Feb. 5. Department of Public Works, Ottawa; Secretary, R. C. Desrochers.

Chatham, Ont.

An agreement has been reached between the Canadian Pacific and Grand Trunk Railways and City Council which authorizes construction of spur line into manufacturing district.

East Whitby Township, Ont.

Plans are in preparation by engineers for 12 concrete bridges to cost $20,000. Owner, East Whitby Township Council. Engineers. Bowman & Connor, 36 Toronto street. Tenders open March 2nd.

Esquimalt, B.C.

The British Columbia Marine Railway, 2214 Pender street, Vancouver, and Esquimalt, will build the dock here. 1,000 feet wide, 36 feet deep; filling out basin 700 feet long by 250 feet width; electric travelling crane will be installed. Cost $3,000,000.

Fredericton, N. B.

Fredericton & Grand Lake Coal & Railway Co.; President, Sir Thomas Tait, plan the development of mine and construction of railroad from Gibson to Minto. Construction will start as soon as subsidy from Dominion Government is re-voted.

Grand Falls, N.B.

A delegation from Grand Falls, N.B., have urged the provincial government to extend the Tobique and Campbellton Railway from Plaster Rock to Riley Brook, a distance of twenty-eight miles.

Haliburton, Ont.

Tenders are called for construction of concrete abutments and steel bridge, 100 ft. clear span; also reinforced concrete truss bridge, 50 ft. clear span over Burnt River. Plans, etc., at office of engineer. Tenders received by engineer until 2 p.m. January 31st. Engineer, Frank Barber, C. E., 57 Adelaide east, Toronto.

Kamloops, B.C.

Provincial Government has decided to place steel bridge on site of old one, corner South Thompson. Work not to be let by contract. Government doing work. Plans are in progress in Public Works Department and construction is expected to start shortly. F. C. Gamble, Public Works Engineer.

Lethbridge, Alta.

A site has been purchased for street car barns on Fifth street, and construction will start as soon as city has made final arrangements. Mayor, Geo. M. Hatch.

Little Lamegue, N.B.

Tenders are called until Feb. for construction of wharf. Plans, etc., at Department, at offices of the District Engineers at Chatham, St. John, N.B., and with local postmaster. Dept. of Public Works, Ottawa; R. C. Desrochers, secretary.

London, Ont.

O. E. Fleming and W. W. Wollatt, representing the Lake Erie Coal Company, of Walkerville, have offered to lease the London and Port Stanley Railway and spend $400,000 in electrifying it and making extensive improvements. The matter is under consideration.

A conference between representatives from the City Council and London Street Railway will be held shortly to discuss the purchase of the road by the city. If the deal goes through the cars will be operated by Niagara power and extensive improvements will be made.

Montreal, Que.

The Harbor Commissioners contemplate 1912 Harbor improvements to cost $2,000,000. Secretary, D. Seath, 57 Common street. Completion of No. 2 elevator; completion and installation of dry dock now being built by Vickers, Son & Maxim; raising of level of Victoria Pier and construction of 5 double deck steel sheds, dredging, etc. Assurance has been given that plans will be approved by Hon. J. D. Hazen, Minister of Marine.

Ottawa, Ont.

Plans for the Canadian Pacific Railway's tunnel have been asked for at once by Hon. F. Cochrane, Minister of Railways and Canals, as he is desirous of taking immediate action on the matter. Entrance of C. P. R. with tunnel approved by City in August. Government was approached regarding narrowing of canal.

City of Ottawa and Gloucester Tp. Council are trying to compel the C. N. R. to build bridge over Metcalfe road, to widen this from 40 ft. to 66 ft. Work is delayed, awaiting action.

On the completion of Bank Street Bridge the Ottawa Electric Railway's line will be extended at once to Ottawa South via Bank, Cameron and Riverdale streets.

Petewawa, Ont.

Tenders are called for improvement of wharf. Owner, Dept. of Public Works, Ottawa; secretary, R. C. Desrochers. Plans etc. at Department and at Confederation Life Bldg., Toronto, and at office of J. G. Sing, district engineer, and on application to local postmaster. Received by secretary until 4 p.m. Jan. 31.

St. Lambert, Que.

Tenders are called for erection of substation 2-storey, 85 x 60, concrete and brick, steel frame, for Montreal & Southern Counties Railway. General manager, W. B. Powell, Canadian Express Building, McGill St., Montreal. Received by General Manager until January 25th. New tenders are also called for car barns, offices, &c., 2-storey, 205 x 85, brick, concrete and steel, iron windows and 4-track sheds.

CONTRACTS AWARDED

Winnipeg, Man.

Bridge superstructure, Osborne street. Contractor, Manitoba Bridge & Iron Works, Logan avenue west, Winnipeg, $116,461. Contract includes cost of tearing down present superstructure and re-erecting it at Arlington street. Whole work to be completed in six months.

Public Buildings, Churches, Schools, etc.

Berlin, Ont.

An effort is being made to organize a joint stock company to build a $20,000 grand stand in the Athletic Grounds at Victoria Park.

Plans will be prepared at once for erection of a club building to cost $15,000, for Berlin Club. President, W. D. Lochead is in charge. Building to be 3 storey, brick, 40 x 75.

Calgary, Alta.

Plans will be prepared for smallpox hospital to cost $10,000. Mayor, Mitchell, Dr. Esley, M.H.O. Council votes the present hospital unfit.

Chesley, Ont.

New tenders will be called for erection of public building. Plans etc. at offices of Thos. A. Hastings, Postal Station F, Yonge street, Toronto; office of Forster & Clark, architects, Owen Sound; at local post office, at Department. Received by secretary until 4 p.m., January 31st. Department of Public Works, Ottawa; Secretary, R. C. Desrochers.

Halifax, N.S.

Tenders are called for installation of a new heating boiler, City Hall. Owner, City of Halifax Board of Works. J. J. Hopewell, Clerk. Specifications at office of City Engineer. Tenders received by Clerk until noon, January 17th.

Kamloops, B.C.

The directors of the Young Men's Christian Association announce that $10-000 is already promised for proposed new building and that definite steps will be taken during spring.

Montreal, Que.

The Provincial Government, Hon. L. A. Taschereau, Minister of Public Wks., plan to demolish the present court house buildings anl erect new buildings to be placed at S. W. corner of present main building. It is understood that work will commence next spring. Cost $250,000.

Melville, Sask.

A by-law to grant a bonus of $6,000 to the Lutheran conference for the establishment of a university was passed.

Nelson, B.C.

A sum of $35,000 has been provided locally for the proposed new Kootenay Lake General Hospital in this city and the Provincial Government has promised a similar amount. This will give a total building fund of $70,000. Plans will be prepared and tenders taken in time to commence work early in the spring. For further particulars address H. H. Currie, secretary, Nelson Publicity Bureau.

Ottawa, Ont.

Work has started for remodelling theatre to cost $10,000, Albert street, for New York Stock Co., Grand Opera House, Ottawa. New dressing rooms, gentleman's smooking rooms, new seats, new front. Construction commenced Jan. 15th.

Plans are being prepared for addition to Y. W. C. A. building, Metcalfe St. Architect, J. A. Ewart, Sparks Chambers, Ottawa. Solid brick addition, to include swimming pool, gymnasium, domestic science room, 21 bedrooms, baths etc.

Pointe-Aux-Trembles, Que.

The village is applying for town charter to Quebec Legislature. Mr. C. A. Reeves, architect, St. James street, Montreal, has been instructed to prepare plans for erection of town hall to cost $30,000.

Richmond, B.C.

Plans will be prepared for municipal hall. The new building will probably be erected in Steveston.

Ste. Agathe, Que.

Incorporators, Mark Workman, 505 Sherbrooke west; M. B. Davis, and J. A. Jacobs, Jacobs Bldg., all of Montreal, have applied for a charter for the establishment of the Mount Sinai Sanitorium.

St. John, N.B.

The Knights of Columbus are contemplating the erection of a new hall. Referred to executive for report in two weeks' time.

Stratford, Ont.

A site has been purchased for new school. Owner, Public School Board; W. Stewart, Chairman Finance Committee, in charge. Clearing of site to commence shortly.

Strathroy, Ont.

Plans will be prepared for Collegiate Institute to cost $40,000. Mayor, Owens. Necessary steps being taken to secure site. Work commenced as soon as possible.

Toronto, Ont.

Plans are in preparation for addition to club house, Centre Island. to cost $38-000, for Royal Canadian Yacht Club. Architect, Jno. M. Lyall, 2 Leader Lane, Toronto. Kitchen and new verandahs.

Tenders will be called about Feb. 23rd for library, Bloor and Gladstone. Architect, Chapman & McGiffin, 59 Yonge st. Vitrified red brick construction, terra cotta trimmings, green tile roofing, hardwood interior finish, marble and tile, steam heating, stock-room equipment.

The following appropriations have been passed by Board of Control: New schools—Clinton street, $75,000; St. Clair avenue, $55,000; Dovercourt district, $60,000; Western avenue district, $60,000; Morley avenue, $115,000. Total, $365,000. Enlargements—Malvern High School, $60,000; Brock avenue or Kent. $75,000; alterations, $55,000; purchase of sites, $45,000. Total, $600,000. Also $10,000 for erection of supply room in Lansdowne school, and $30,000 workshop and store room at Jesse Ketchum.

Tenders will be called in about two weeks for college to cost $350,000, St. George street; owner, Board of Governors, Knox College. Architects, Chapman & McGiffin, 59 Yonge street, Tor. Concrete work in charge of Leach Concrete Company, 76 Albert street, Toronto. Credit Valley grey stone construction, cut stone trimmings, fireproofing, concrete work, metal sash, electric ltg., ventilating system, steam heating, slate roof.

The 1st Avenue Baptist Church are considering the erection of a new Sunday School. Cost, $16,000. Building to be brick with slate roof.

Estimates and plans are being made for a public comfort station at corner of College and Spadina and another at Bathurst and Bloor streets.

Quebec Amusement Co., Montreal, are looking for a site for erecting a fireproof theatre at Toronto. H. W. Conver, 221 Fairmount avenue, is interested.

Plans are in progress for monumental gateway to Exhibition Grounds. Owner, Dominion National Exhibition Association. Architect, Geo. W. Gouinlock, 1103 Temple Bldg. Art stone and wrought iron. Tenders open about Mar. 1st.

Plans are in preparation for exhibition building to cost $140,000, for Canadian National Exhibition, City Hall. Architect, Geo. Gouinlock, 1103 Temple Bldg., Toronto. Brick, steel, cut stone trimmings. Tenders to be called shortly.

Victoria, B.C.

Section of Provincial Government Jail Building burned, on Topaz avenue. Damage estimated at $5,000. It is thought that a new fireproof building will be erected, the old one being inadequate.

Winnipeg, Man.

A by-law will be submitted for city hall and Board of Control are likely to call for competitive plans within the next few weeks. Controller Douglas is interested. M. Peterson, secretary Board of Control.

Westmount, Que.

A site has been purchased for church to cost $100,000, for Westmount Methodist Church. Pastor, Rev. W. Ernest Baker, 481 Argyle avenue, Westmount. Site 111 ft. x 140 ft. Building fund has been started.

Residences

Calgary, Alta.

A permit has been granted for residence to cost $4,000, Rosedale, for J. Montgomerie, Box 485; 25 x 39, brick veneer, concrete foundation, hot water heating, electric lighting, shingle roofing, hardwood interior finish.

Montreal, Que.

New tenders are called for cottage, cost $12,000, St. Antoine and Highland, for N. Jasmin, Notre Dame de Grace. Architect, Dalbe Viau, 76 St. Gabriel st., Montreal. Two and one-half storeys, 35 x 48, brick, encased, stone foundation, hot water heating, electric lighting, asbestos shingle roof, hardwood interior finish. Tenders received by architect until January 27th.

Foundations are in for 3 flats to cost $3,000, Cartier street, for Ferdinand Pare, 997 Cartier street, Montreal; 3 storeys, 25 x 38, brick, gas and electric lighting, gravel roofing, concrete foundations.

N. Pigeon, 2010 Hutchison street, will commence work in March on erection of 3 flats to cost $5,000. Three-storey, 23 x 65, stone and pressed brick, stone foundation, hot water heating, gravel roofing, gas and electric lighting .

Ottawa, Ont.

K. Cohen, 140 Nelson street, Ottawa, is planning a new residence to cost $3,200, Archibald street. Two storeys, 18 x 43, brick veneer, steam heating, concrete foundation, electric lighting. Permit granted to-day.

Tenders will be called for residence to cost $3,000, Turner street, for D. L. Campbell, 116 A Fourth avenue; 2-sty., 30 x 34, double brick veneer, concrete foundation, steam heating, electric lighting.

St. Lambert, Que.

The Daoust Realty Co., La Presse Bldg., Montreal, have purchased some 6,000 lots on St. Lambert Heights for the erection of residences.

Sandwich, Ont.

Melvin, Church. Essix, and J. W. Rosier, Windsor, are contemplating the erection of thirty residences to cost $75,000. Seven-room, brick. Work will probably commence in the spring.

Simcoe, Ont.

Tenders will be called for residence to cost $10,000, for Chas. Innes, Simcoe st. Architect, L. D. Barber, Brantford. 3-storey, 38 x 54, brick, concrete and stone foundation, hot water heating, electric light, shingle roofing, hardwood interior finish. Tenders received by architect after Jan. 31, until February 10th.

Toronto, Ont.

Tenders are open for erection of a residence to cost $7,000, for R. B. Bond, 131 Ulster street. Architect, H. Bryan Gilbert. Stone, stucco and brick, shingle roof, hardwood flooring, billiard room.

A permit has been granted for residence to cost $3,200, Temple avenue, for W B. Charlton, 140 Close avenue, brick, tar and gravel roofing, hot air heating, electric lighting.

Sketches are in progress for residence to cost $8,000, Rosedale E., for J. Lowell, 119 Madison avenue. Architect, Langley & Howland, Continental Life Bldg., Toronto. Brick, cut stone, mantles and tiles, hardwood finish.

Plans are completed for pair dwellings to cost $4,800, 13-15 Heath street, for P. Coltman, 187 Robert street. Architect, J. G. Hedges, 86 Clinton street. 2-sty. and attic, semi-detached, brick.

A permit has been granted for 1 pair semi-detached dwellings to cost $4,600, 33 Edna street, near Dundas, for C. L. Gray & Sons, 34 Runnymede road; brick.

Tenders are open for pair dwellings, cost $4,200, Nina and Bathurst streets, for P. Coltman, 186 Robert street. Architect, J. G. Hedges, 86 Clinton street; 2½-storey, solid brick, hot water heating, gas and electric light, mantles and tiles, hardwood floors, shingle roofing.

A permit has been granted to erect a detached dwelling to cost $2,800 on Kingswood road, for A. E. Booth, 75 Leuty avenue. Brick and stone, shingle roofing, cut stone, mantles and tiles, hardwood floors and finish, plate glass. Credit Valley Brown or New Brunswick stone.

Plans have been drawn for pair dwellings to cost $6,000, on Ramsford avenue, near Dickson street, for Eli Prince, 15 Garnet avenue. Architect, Wm. S. Thompson; 2-storey, semi-detached.

Tenders are open for the erection of pair dwellings, to cost $14,000, on Augusta avenue, for Caplin & Layansky, 41 Bellwoods avenue. Architect, J. G. Hedges, 86 Clinton street, Toronto. 2½ storey, solid brick, gas and electric lighting, hot water heating, mantles and tiles; pine interior finish, shingle roofing.

Vancouver, B.C.

Plans are being prepared for addition to apartment building to cost $40,000, for Miss Jean Mollison, Victoria. Architect, J. D. S. Taylor, Bower Bldg., Vancouver. Three-storey addition to Criterion Bldg., 33 bed rooms, new hot water heating plant, new kitchen, new bar, cafe and grill, 16 baths. Plans completed about Feb. 1st. Later addition planned will cost $60,000.

R. J. Coleman, 135 Hastings street west, is contemplating the erection of an apartment house on 7th avenue and Caroline street to cost $50,000. Three-sty., brick, 35 modern suites, hot water heating.

Verdun, Que.

Henry Carter, 150 Gertrude street, Montreal, will build a house on Gertrude street to cost $3,000. Two-storey, 24 x 36, brick, concrete foundation, gas lighting, gravel roofing. Work not started.

Victoria, B.C.

Plans are being prepared for 9-room bungalow for H. Harkness. Architect, L. W. Hargreaves, 12 Green Blk., 2-sty., basement, hot water heating. When plans are completed tenders for general contract will be called.

Tenders will be called at once on general contract for apartments to cost $11,000. Architect, J. C. M. Keith, 1122 Government street; 3-storey, brick. Tenders taken separately for heating, plumbing and electric wiring.

CONTRACTS AWARDED

Fort Erie, Ont.

Residence to cost $2,500, High street, for Wm. Nauert, care B. F. Matthews, Fort Erie. Builder, Peter B. Troupe, Fort Erie. Two and one-half storeys, frame, concrete foundation, electric ltg., gas heating, shingle roofing, hardwood interior finish.

Montreal, Que.

Excavation is done for 3 flats to cost $3,500, Garnier, for Mrs. C. Lamarche, 776 Lafontaine East, Montreal. Builder, E. Rieudeau, 776 Lafontaine East. 3-storey, 24 x 40, brick, stone foundation, gravel roofing, stove heating.

Two residences on Grosvenor avenue, for T. Lamb. Architect, Nobbs & Hyde, 49 Beaver Hall Hill. Builder, Wm. M. Irving, 6 Guy Block, Montreal.

C. Chamelet, 101 Luke street, Montreal, is excavating for dwellings and stables to cost $18,000, Aqueduct and Overdale. Architect, McDowell & Henderson, Bank of Toronto Bldg., Guy st., Montreal. General contractor, John Nutt, 106 City Councillors street, Montreal. Building to be used for Riding School.

Toronto, Ont.

Apartments, Wellesley near Sumach, for E. Wickett, 431 Sumach street. Architect, E. G. Wilson. Carpentry, Young & Crone, 7 Spruce street; roofing, Mr. Breckin; plastering, Taylor & Nesbitt, 18 Havelock street; paint and glass, Jno. Robinson, 139 Amelia street; plumbing and heating, Chas. Tyler, 20 Price street.

Residence to cost $5,000, cor. Indian road and Radford avenue, for Mrs. W. F. Sparling, 19 North street; builder, J. A. Harrison, 43 Law street. 2½ storeys, brick, half timber, cut stone, mantles and tiles, hardwood finish, stucco, plate and art glass.

Apartments to cost $9,000, on Avenue road, for Jno. J. Walsh, 37 Adelaide E. Architect, S. A. Wagett, 61 Bleeker st. Builder, S. Nesbitt, 25 Springhurst ave. 3-storey, brick and stone.

Permit granted for dwelling to cost $2,800, 451 Gladstone avenue, for J. H. McCombe, 188 Grace street, Toronto. Builder and architect, T. Crouch, 911 Dovercourt road, Toronto.

Pair residences on Hughes avenue, for F. Lyonde, 101 King west. General contractor, Geo. H. Walter, 104 Ossington avenue, Toronto. Architect, Edwards & Saunders, 18 Toronto street. Semi-detached.

Residence, cost $6,000, Admiral road, near St. George street, for Prof. V. Henderson; architect, owner; builder, Jno. McKerracher.

Two apartment houses, cost $80,000, 35 Avenue road near Lonsdale ave., for John J. Walsh, 37 Adelaide street east, Toronto. Architect, S. A. Waggett, 61 Bleeker street. Builder, S. Nesbitt, 25 Springhurst avenue. Three storeys and basement, brick, reinforced concrete, electric lighting, steam heating, tar and gravel roofing, skylights, tiles, boilers, fire escapes, machinery.

Business Buildings and Industrial Plants

Bassano, Alta.

A site has been purchased for cold storage plant for Calgary Brewing and Malting Company, Calgary; president, A. E. Cross. Erection of plant will commence early in the spring.

Lewis Williams, Seattle, is contemplating erection of a factory to employ

(Continued on page 67)

Tenders and For Sale Department

To Engineers

Every man who puts in a tender on your jobs has got to see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

More contractors and manufacturers read the "Contract Record" than any other Canadian publication. It is the logical place to look for tenders called, and where all important works are advertised.

Send along your plans for your next job and put a line in your ad. to that effect.

Contract Record

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—441 Seymour Street.

Sewer Excavator

For sale for immediate use, a Vulcan "Little Giant" Steam Shovel with extra long dipper handle for excavating to 16 feet below surface, mounted on traction wheels, dipper 1¼ yd. capacity. Machine just overhauled; new chain, and extra large new boiler; weighs 32 tons; low price. Address

WILLIS SHAW MACHINERY Co.,
39 South LaSalle Street,
42-t.f. Chicago, Ill.

Miracle Cement Block Machine for Sale

We have a Miracle Cement Block Machine for sale, also a tile and brick machine which have been used about three months.

Will dispose of same at a very reasonable figure.

Stinson Reeb Builders' Supply Company, Ltd.,..
Tenth Floor,
Eastern Townships Bank Building,
4-5 Montreal, Que.

City of Calgary, Alberta

Tenders for Bridge

Sealed tenders marked "Tenders for Bridge," addressed to the City Clerk, Calgary, will be received up to noon of **10th February, 1912**, for the supply of material and construction of a Steel Bridge, 30 feet wide, in three spans of 150 feet each, on concrete substructure, across the Bow River, within the city limits.

Plans and full information at the office of the City Engineer, Calgary.

Each tender to be accompanied with a marked bank cheque payable to the City Treasurer for the amount of $500, which will be forfeited should any party whose tender is accepted fail to execute the contract. The cheques of unsuccessful tenderers will be returned.

The lowest or any tender not necessarily accepted.

CITY COMMISSIONERS,
3-6 Calgary, Alta.

Location Wanted

Advertiser desires to learn of good opening in Western Canada for an electrical contractor; would invest some capital or join others in starting a plant. State population of town, particulars and inducements. Box 418, Contract Record, Toronto, Ont. 4-5

For Sale

Ayr electric light plant in first class condition, steam power, good service and contracts. Exclusive franchise in town of 1,200. A splendid chance for a practical man. Being sold because of owner's death. Apply D. M. Clark, 15 McKenzie Crescent, Toronto, Ont. 2-4

Plant for Sale

13 mile 56 and 60 pound rail and fishplates.
10 mile 80 pound rail and angle bar.
Also 16, 20, 30, 40, 50's.
New rail, all sections in stock.
One 10 x 16 Porter Locomotive, Standard gauge.
Sixteen 4-yard Steel Rocker Dump Cars, Standard gauge.
One 45-ton Thew Steam Shovel.
For particulars apply to

J. J. GARTSHORE,
4-5 Toronto, Ont.

New Parliament Buildings

Winnipeg, Man.

The Government of Manitoba will receive competitive drawings for New Parliament Buildings to be erected in the City of Winnipeg.

Copies of regulations governing the competition may be obtained from Mr. James Hartney, 77 York Street, Toronto.

The date for delivery of preliminary plans in connection with above competition is extended to March 31st. 4-5

COLIN H. CAMPBELL,
Minister of Public Works.

TOWN OF SOURIS

Water Works Debentures For Sale

Sealed tenders addressed to the undersigned will be received up to 6 o'clock p.m., **February 12th, 1912**, for the purchase of $93,570.12 30-year Debentures with coupons attached, dated December 1st, 1911, bearing 5 per cent. interest payable in annual instalments of principal and interest, Debentures shall be made payable at the Merchants Bank of Canada, at Souris, Man.

The lowest or any tender not necessarily accepted.

For further particulars apply to

J. W. BREAKEY, Sec.-Treas.,
3-4f Souris, Man.

CITY OF SASKATOON

Tender for Pavements

Sealed tenders addressed to the City Commissioners, and endorsed "Tender for Pavement," will be received up to 12 o'clock noon on **Friday, February 16th, 1912**, for the construction of approximately 125,750 square yards of Pavements. The Corporation reserves the right to divide the work into three approximately equal Contracts and to reject any or all tenders.

All information may be obtained on application to George T. Clark, City Engineer, Saskatoon, Sask.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., Jan. 13th, 1912 4-5

CITY OF SASKATOON

Tender for Concrete Sidewalks

Sealed tenders addressed to the City Commissioners, and endorsed "Tender for Concrete Sidewalks," will be received up to twelve o'clock noon on **Friday, February 16th, 1912**, for the construction of approximately 621,200 square feet of Concrete Walk and 100,950 lineal feet of Curbing.

The Corporation reserves the right to divide the work into three approximately equal Contracts and to reject any or all tenders. All information may be obtained on application to George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., Jan. 13th, 1912 4-5

CITY OF SASKATOON

Tender for Substructure 23rd Street Subway

Sealed tenders, addressed to the City Commissioners, and endorsed "Tender, Substructure 23rd Street Subway," will be received up to twelve o'clock on **Friday, February 23rd, 1912**, for the construction of the Substructure for a Subway under the Canadian Northern Railway Company's tracks at 23rd Street, in the City of Saskatoon. The Corporation reserves the right to reject any or all tenders. All information may be obtained on application to W. L. MacKenzie, C. N. R. Bridge Engineer, Winnipeg; George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., Jan. 18th, 1912. 4-5

TOWN OF SOURIS

Sewer Debentures for Sale

Sealed tenders addressed to the undersigned will be received up to 6 o'clock p.m., **February 12th, 1912,** for the purchase of $28,000 30-year Debentures with coupons attached, dated December 31st, 1911, bearing 5 per cent. interest payable in annual instalments of principal and interest, Debentures shall be made payable to bearer at the Merchants Bank of Canada at Souris, Man.

The lowest or any tender not necessarily accepted.

For further particulars apply to

J. W. BREAKEY, Sec.-Treas.,
Souris, Man.

3-4f

Business Buildings and Industial Plants

(Continued from page 65)

about 100 hands. New cottages will also be erected.

Bridgeburg, Ont.

Plans are being prepared for foundry, warehouse, shops, offices, etc., South Ward, for The Tuttle-Bailey Manufacturing Co., of Cleveland, manufacturers of Ferro Steel Heating registers. Supt. Peter Gordon, Jarvis Street, Bridgeburg, foundry, warehouse, japan ovens, office, machine shop. Site purchased near G. T. R. tracks.

Calgary, Alta.

The Albertan Commercial Travellers' Association & Northwestern Commercial Travellers' Association combined will erect in Calgary an hotel building to include club rooms, stores and offices. Cost $100,000.

Associated Workmans Co., Ltd., capital $300,000; president, L. S. Mackid, physician; sec.-treas., F. Jacobie, broker, are contemplating a large office building to cost $50,000. Manager, J. H. Sherman.

Edmonton, Alta.

Tenders will be called for addition to hotel on Jasper street, Pendennis Hotel, proprietor, Mr. Bell. Architects, Long & Major, First street. Three storeys, brick, stone, 60 ft. on Jasper ave., sixty rooms, rotunda 35 ft. in diameter. Tenders called by architects on February 1st, will close probably on February 15. Brick and stone have been purchased.

Fonthill, Ont.

Plans are being prepared for canning factory for Dominion Canners, Limited, Hamilton; general manager, Mr. Nairn.

Plans to be ready in about three weeks, when contracts will be called.

Frank, Alta.

Keystone Portland Cement Co. are contemplating the erection of a new cement plant Vice-president, E. A. Cunningham, Lethbridge; director, P. Lund, Wardner, B. C. Building will probably commence at once.

Hamilton, Ont.

It is reported that preliminary plans have been prepared for the erection of a large hotel to cost $100,000, containing 200 rooms. Daniel McCormack, proprietor Hotel Cecil, is interested.

Kamloops, B. C.

Western Canada Trust Company, Vancouver; representative, Dr. C. V. Coombs, are contemplating the erection of store and apartments, cost $55,000. Architect, G. B. Kaufmann. Three storeys, brick. It is stated that sufficient funds are on hand to carry it through.

Kipp, Alta.

J. V. Harrington, Kalispiel, Montana, is contemplating the erection of a new hotel here to cost $20,000.

Lethbridge, Alta.

At a recent meeting of directors of the Swift Canadian Co., Chicago, $75,000 was set aside for branch here. It is not known whether plans include a packing plant. Site will be selected shortly. By-law being prepared. Mr. Willis, Alberta representative.

London, Ont.

The Tuckett Cigar Company, Hamilton, are contemplating enlargement of plant in London either by leasing or building new premises. Additional factory equipment will be required.

Merritton, Ont.

By-law to grant exemption to Gardiner Basket & Wood Turning Co. for the erection of a new basket factory.

Montreal, Que.

The City of Montreal Board of Control have under consideration expropriation of property for enlargement of Bonsecours market.

Plans are being prepared for store and residence, Mt. Royal and Fabre sts., for Mr. Gougeon, St. Laurent, Que. Architect, Dalbi Viau, 76 St. Gabriel street, Montreal.

The "Sauvegarde" Insurance Company; manager, P. Bonhomme, is contemplating the erection of an office building, cost $250,000, southeast corner Notre Dame and St. Vincent streets. Ten storeys, fireproof. Southwest corner also purchased. Two sites cover 19,000 feet.

C. C. Holland, c/o G. A. Holland & Son Co., 519 St. Catherine street west, are contemplating the erection of business building, cost $500,000. Two buildings probably equipped as stores and offices, seven and eight storeys, fireproof. Owner states that construction will not probably be undertaken within a year.

Crown Trust Company, 86 Notre Dame street west, have recently purchased building at 225-29 St. James street and plan to remodel into an up-to-date office building.

A site has been purchased at southeast corner Craig and St. Lawrence Boulevard, 54 x 92, by Lande Bros. & Company, Montreal. Owner intends to erect a ten-storey office building when existing lease expires in two or three years.

Nanaimo, B. C.

Plans will be prepared for erection of bank building for Royal Bank of Canada. Two storeys, brick.

New Glasgow, N. S.

Work will start shortly on the erection of addition to knitting mills for Nova Scotia Knitting Mills. Work is being rushed to accommodate new machinery that is now being ordered.

It is understood that a company are to take out a charter soon to manufacture woolen goods in the vicinity of New Glasgow, N. S. It is proposed to utilize the water power of the East River near Riverton.

Newago, Que.

H. G. Louch , 18 Notre Dame de Lourde, Montreal, is planning to erect a summer hotel here and Mr. G. A. Southee, Outremont, and several other Montreal citizens will build summer cottages here

North Battleford, Sask.

Tenders will be called after February 1 for machine shop, cost $10,000, for Messrs. Clark & Co. Architects, Stephenson & Evans, North Battleford.

Petrolea, Ont.

A number of local men are interested, also Molson's Bank, in the proposed establishment of a shoe manufactory here. Cost $40,000. Address John McHattec, clerk, for further particulars.

Peterboro, Ont.

The Quaker Oats Company announce their intention to build a branch at a point west of Winnipeg in the spring.

Preston, Ont.

Tenders are invited for erection of block of stores for Geo. Bernherdt & Co., King street, Preston, capital, $25,000. Architects, H. Gale Legg, Preston. Three stores. A quantity of steel will be used.

Plans will be prepared for two stores, cost $9,000, King street, for Mrs. Darnley. Architect, H. Gale Legg, C.E., Preston. Three storeys, steel beams, metal cornice, metal ceilings. Tenders will be called about March 1st.

Plans will be prepared for five stores, cost $16,000, Potter and King streets, for John Wirsching; architect, H. Gale Legg, C.E., Preston. Three storeys, reinforced concrete, steel beams, metal cornices and ceilings.

St. John, N. B.

H. J. Garson, president Garson Coal Co., is planning to remodel the Scammell building into a modern office bldg.

Sarnia, Ont.

Sarnia Canning Company contemplate the erection of an addition to canning factory. Work will be started as soon as plans have been completed.

Sault Ste. Marie, Ont.

Negotiations are in progress for extension to paper mills of Lake Superior Paper Company, Limited; president, H. E. Talbot. It is thought that the concessions the town is willing to grant to company will be considered satisfactory by directors in England whom Mr. Talbot will interview this month. Plans entail expenditure of $1,000,000.

Sooke, B. C.

A site has been cleared for a modern hotel, Mouth of Sooke River, for Michigan Lumber Company. Plans are being prepared. It is expected that work will begin early in spring.

Strathroy, Ont.

Strathroy Canning Company (Dominion Canners Limited), Hamilton, plan to erect a two-storey extension to canning factory. It is stated plans are being prepared and that additional equipment will be purchased. Cost $10,000.

Toronto, Ont.

Tenders were called until January 17th for factory addition, cost $9,000, Gladstone avenue, for Wm. Neilson Company, Gladstone avenue. Architects, Chadwick & Beckett, 18 Toronto street. Brick and mill construction, composition roofing, heating plant extension, electric lighting.

A site has been purchased on Macdonnell avenue for a baseball factory for A. J. Reach Company, Philadelphia.

Tenders are open for new wing to lamp factory, cost $60,000, Dufferin St. building, for Canadian General Electric, King street west. Architect, E. Bird, Traders Bank, Toronto. Berea sandstone, reinforced concrete floors, galvanized iron roof or asbestos shingles, cast iron columns, structural steel, steel lintels, verandahs, fire escapes, fireproof doors and window sills, steel rolling doors, ornamental iron, passenger elevators, sheet lead, opaque plate glass.

A. Gillies, 548 Dovercourt road, will build a store and dwelling, cost $7,500, N.S. College near Euclid. Architect, J. Stanford, 17 Westmoreland ave., Toronto. Three storeys, brick, stone foundation hardwood floors, structural steel, cut stone, stained shingles, galvanized cornice, fireproofing, stables, shop front, tar and gravel roofing.

Tenders are open for warehouse for Bachrack Company, Limited, 71 Bay st., Toronto. Masonry, carpentry, plumbing, heating and elevator; plans, etc., with company.

Tenders are open for store and dwellings, cost $12,000, Dundas near Gladstone, for Messrs. Griffiths & McConnell, 651 Dundas street. Architect, J. M. Cavan, 65 Adelaide street, Toronto. Three storeys, brick, stone foundation, hot water heating, gas and electric light, cut or Grey Indiana stone, ornamental shop fronts, sidewalk lights, structural steel, tar and gravel roofing, galvanized cornice.

A permit has been granted for stores and apartments, cost $7,500, Pape and Danforth avenues, for E. Flaxman, 350 Broadview avenue. Architect, S. Makepiece, 50 Gerrard street, Toronto. Three storeys, solid brick, plate glass, galvanized cornice, tar and gravel roofing.

Plans are completed for stores and factory, cost $20,000, S. S. Queen street, for M. Healy, 153 St. George street, 3-storey, brick and steel, tar and gravel roofing, structural steel, cut stone, hardwood finish, plate and art glass, galvanized iron cornice sidewalk lights.

Plans are completed for addition and alterations to furniture store, cost $6,000, 401-405 Queen street west, for S. Levinter, 410 Queen street west. Architect, Chas. F. Wagner, 15 Toronto street. Three storeys, brick, tar and gravel roofing, Credit Valley stone, reinforced concrete footing, open shop front, prism glass, galvanized iron.

Plans have been revised for a garage, cost $2,500, S. E. corner Huntley street, for Chadwick & Beckett, 18 Toronto street. Brick, composition roofing, hot air heating, electric lighting, art stone.

McGregor & McIntyre, Pearl street, are contemplating the erection of a foundry on Pearl street to cost $30,000. Not ready for business till March 1st. Building to be of structural steel and brick, new machinery will be installed.

Victoria, B.C.

Plans are being prepared for remodelling of biscuit factory, cost $9,000, for Popham Bros., Ltd., confectioners, 242 Mary street.

CONTRACTS AWARDED

Brantford, Ont.

Work will begin shortly on the erection of a garage for James Adams. Builders, Schultz Bros. Company, Ltd. One storey, 18 x 20, brick, concrete foundation, shingle on asbestos roofing. Contract let January 10th.

Calgary, Alta.

B. Gray, Calgary, and M. Weaver, Bassano, are contemplating the erection of a business block in the spring on two lots purchased. Mr. Gray will open a photographing business.

Montreal, Que.

Work is started on re-building business block for National Trust Company, 153 St. James street, Montreal. Builder, R. E. Edwards & Son, 200 Versailles st., Montreal. Repairs after fire to building two storeys and basement, stone foundation, hot water heating, electric lighting, gravel roofing. Premises occupied by Alex. Nelson, furriers; Wills & Wills, tailors; and Gravel Freres, grocers.

Tod Inlet (Vancouver, B.C.)

The Portland Cement Company are excavating for cement plant, cost $1,000,000. Contractor, McAlpine, Robertson Construction Co., 404 Homer street, Vancouver. It is expected that work on structure will be started as soon as weather permits.

Toronto, Ont.

Warehouse, cost $7,000, for Sterling Lace & Novelty Co. Architects, Curry & Sparling; builder, Mr. Emphy; masonry, Thos. Brick, 716 Broadview; carpentry, Wm. Clark & Son; roofing, E. T. McCullough; paint & glass, A. E. Phillips; plumbing, Purdy Mansell; elevator, Otis Fensom. Tenders closed December 6th.

Store and dwelling, cost $6,000, 717 Queen street east, for Jas. A. Bleakley, Queen street. Builders, Griffiths & Scott.

Stables for the Hendry Cartage Co., Weston. Architects, Chadwick & Beckett; masonry, Davidge & Lunn, 684 Bathurst street; carpentry, Mr. Heal; roofing, H. Williams; paint and glass, J. G. Brennen; plumbing and electric wiring, Keith & Fitzsimmons.

Motor car factory, cost $30,000, Avenue road, for Wolseley Tool & Motor Co. Architect, E. J. Lennox, 144 Bay street; masonry, Page Co., Charles st. west; steel, Hamilton Bridge Co., Hamilton; stone, Roman Stone Co., 504-5 Temple Building; carpentry, T. V. Gearing, 102 Carlton street; plumbing, Keith & Fitzsimmons, 111 King street; paint and glass contract awarded to James Casey.

Winnipeg, Man.

Superstructure, office building, for Union Trust Company, Limited; local manager, W. W. Evans; architect, John D. Atcheson, Bank of Toronto Building, Winnipeg; contractor, Geo. A. Fuller Company, 1001 Union Bank, Winnipeg; ten storeys, terra cotta, fireproof, steel and concrete, vacuum cleaning.

Power Plants, Electricity and Telephones

Calgary, Alta.

Acting City Clerk James Barnes. Bylaw will be submitted to raise by debentures $368,000 for further equipping the Municipal Light & Power System Vote takes place January 29th.

Edmonton, Alta.

It is said that tenders will soon be called for another 2,000 kw. turbo-generator and a 700 kw. rotary converter or motor-generator set. City Engineer, A. J. Latornell.

Hamilton, Ont.

The city is appealing to Ontario Legislature to authorize Ontario Municipal Board to compel Cataract Power Company to bury wires; also asking Dominion Railway Commission to order G. N. W., C. P. R. and Bell Telephone Companies to bury wires in central districts. Should order go through telegraph companies will have a mile or so each to bury and the Cataract Company's contract will be heavy.

Rough plans have been prepared for artificial gas plant, cost $200,000, for Ontario Pipe Line Company, Sun Life Building, Hamilton. General Manager, P. V. Byrnes. Preparing to meet competition of United Gas & Coke Company, which is likely to take over and re-equip Hamilton Gas Light plant.

Lachine, Que.

Dominion Government being asked to replace old electric cable under canal by wires strung on high towers.

Niagara Falls, Ont.

Power house addition for Electrical Development Co. Builder, Page & Co., Charles street, Toronto. Brick, cut stone, reinforced concrete, fireproofing.

Ottawa, Ont.

Ottawa Electric Railway Company contemplate purchase of oil burning engines or large steam engine to produce between three and four thousand horse power as an auxiliary plant. Present plant operated by water power.

St. Thomas, Ont.

Council will consider shortly the placing of cluster lights and iron standards on main streets here.

The Toronto Electric Light Company require transformers and electrical equipment for steel and galvanized iron transformer shed on Gerrard street near River, to cost $4,500. Architect, T Wright; builder, T. Wright, 158 Amelia street.

Miscellaneous

Guelph, Ont.

On the recommendation of Chief of Fire Department the council will purchase 500 feet of hose. Extensive alterations are planned for hose tower.

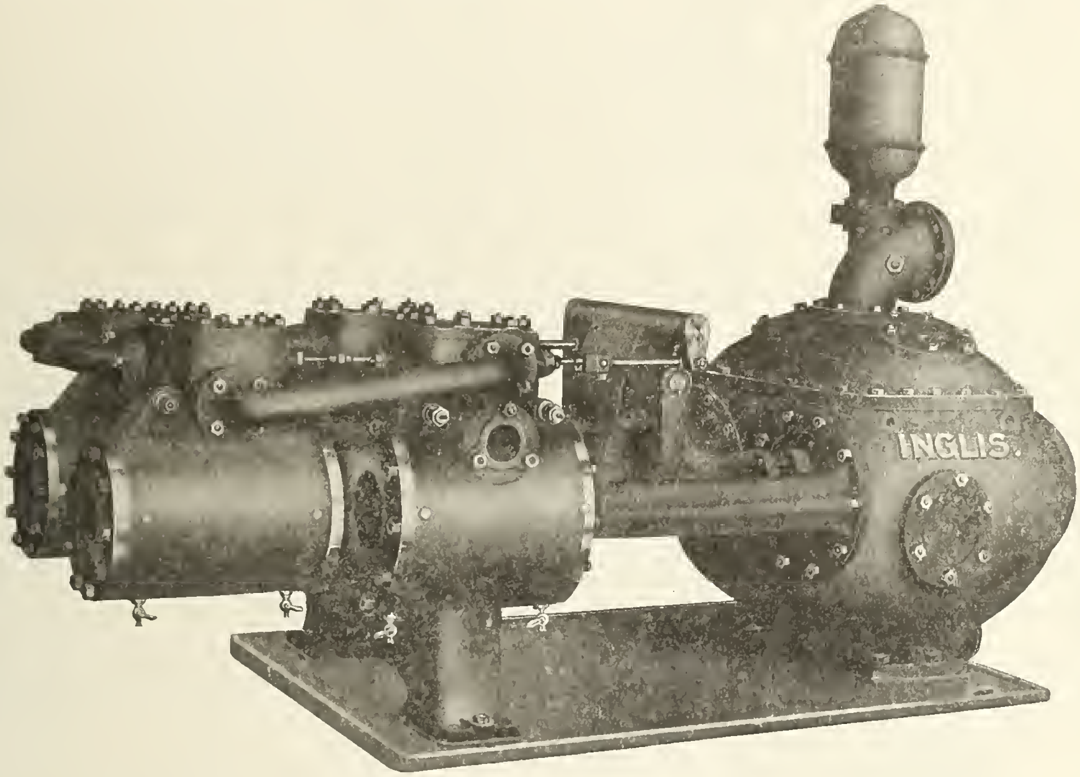
Hamilton, Ont.

Tenders are called for 1912 municipal supplies. Sewer pipe, lime, sewer brick, castings, asphalt, creosote wooden blocks, Portland cement, road oil, gravel, lumber, lead, pig iron, iron pipe, valves, hydrants and extension boxes. Tenders marked "Tenders for Sewer Pipe" addressed to Mayor received un-

(Continued on page 70)

Water-Works Plants

for Towns and Cities



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Send us your inquiries.

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Engineers and Boilermakers

14 Strachan Ave., TORONTO, Canada

Miscellaneous

(Continued from page 68)

til 10 a.m., February 6th. Specifications at office of city engineer. Mayor, Geo. H. Lees. City Engineer, A. F. Macallum.

Maisonneuve, Que.
The City of Maisonneuve requires increased fire equipment, including a large capacity fire engine.

Ottawa, Ont.
The recommendation of Board of Control re purchase of horse drawn engine is likely to be passed by council. Tenis likely to be passed bp council. Tenders will then be called at once.

Vancouver, B. C.
Tenders are called for 1912 supply of cement, pipe, etc., C.I. castings, cement, sand and gravel, sewer pipe and fittings, pig lead, lead pipe, galvanized pipe fittings, lubricating oils and greases, hardware, engineers supplies, etc. Specifications from agent. Called by agent until January 27th. Purchasing Agent, James Stewart, City Hall.

Yarmouth, N.S.
The council has authorized the purchase of a "Cellar Branch" fire fighting apparatus, and also of three miles of copper wire for fire alarm system; 11 miles will be required in the spring. Hiram Goudey, town clerk.

Business Notes

Copper Cliff, Ont.
Canadian Copper Company's hospital burned. Loss on building estimated at $40,000; on equipment $10,000. It is stated hospital will be re-built.

Calgary, Alta.
The Dominion Sawmills & Lumber Company, Limited; local representative, I. C. Smith, has acquired extensive properties in British Columbia, Mundy Lumber Company, of Three Valley; timber limits of Revelstoke Sawmill Company; Hood Lumber Company; Taft & Yale; Columbia Lumber Co., Ltd. Chief office for manufacturing and sales end will be located in Calgary.

Eastwood, Ont.
The school recently remodelled was practically destroyed by fire. It is stated that a new school will be built.

Ethel, Ont.
Fire destroyed flour mills of J. W. Heney. Loss $7,000, almost all covered by insurance. A large mill may be erected in the spring.

Halifax, N.S.
On the 12th inst. the five-storey brick building of Halifax Herald was destroyed by fire, also W. S. Munny's dry goods store. The Canada Life Assurance Co. and the U. S. Consulate were tenants. Loss $500,000.

Hamilton, Ont.
A syndicate of which J. J. Mackay, C.E., Hamilton Provident & Loan Bldg., is head, has option on two mile strip of land. Plans include a drive 100 ft. wide. City to share cost. Land will be reserved for summer homes. $700,000 involved in land transfer.

Vinegar factory, MacNab and Stuart streets, of Dominion Vinegar Company, burned. President, F. H. Yapp, 391 Aberdeen avenue, Hamilton. Loss, $20,000. Company will have temporary quarters on Stuart street. Large modern brick building costing about $25,000 will be erected on present site.

Lindsay, Ont.
Fire destroyed grocery store of McDonald Estate; tenants, Fox & Brady. Damage to stock $6,000.

London, Ont.
Assembling shop, threshing machines, of Geo. White & Sons, Co., Ltd., Cabell avenue, London, damaged to the extent of about $25,000. Tools and stock destroyed will be replaced at once. Building repaired as soon as possible.

MacLeod, Alta.
Fire damaged Purity Bakery, offices of Smith & Beer, Macleod & Gray, F. Sevenson. Total loss, $6,500.

Montreal, Que.
Furniture store of F. Lapointe, 625 St. Catherine street east, Montreal, burned. Damage estimated at $25,000.

Office building at 32 McGill College avenue of Grand Trunk Railway Superannuation Association, burned. Tenants, Cambridge Corporation Limited. Ladies and children's wear. Messrs. Montgomery Ross & Co.; Mr. Frank C. Fox, Geo. A. Smith and family; loss on contents about $40,000; building $8,000. Repairs will be made shortly.

Clothing store of J. Rosenthal & Sons, clothing jobbers, 223 Notre Dame street west, Montreal, damaged to the extent of $2,500 by fire on 12th inst.

Fire damaged the building at 1455 St. Lawrence Boulevard on the 17th inst. to the extent of $20,000. Dr. S. S. Sperber was a tenant.

J. P. Gratton's residence, 488 Sherbourne street, burned. Damage estimated at $1,000.

Ottawa, Ont.
St. John's Anglican Church on Sussex street destroyed. Loss $25,000 on building; $6,000 on contents. Building owned by government, stood on site of proposed new government buildings.

Three residences and stable on York street, owned by N. A. Brohinsky and L. Mirsky, destroyed by fire on 11th inst. Loss about $6,000.

Regina, Sask.
The McCarthy Supply Company's 3-storey store building with part occupied by 44 roomers, was destroyed. Loss estimated as follows: building $60,000; stock $110,000; fixtures $10,000.

Sherbrooke, Que.
Bell Telephone Co. and The People's Telephone Co. are arranging a certain form of amalgamation. As far as can be learned, Bell Company takes over city business, leaving outside business in Eastern Townships; total business to be divided as a percentage. Permission about to be obtained from Quebec Legislature. Amalgamation about March 1, 1912.

Strathroy, Ont.
Rapley & Company's drug store burned. Damage estimated at $3,000.

Sydney, N.S.
Moving picture theatre burned belonging to Finlay MacDonald, City Solicitor. Leasor, George Wambolt. Loss on building, $2,500.

Mr Bilby, manager. Damage to top flat, music, rolls, etc., $10,000.

Toronto, Ont.
The premises of the Allen Mfg. Co., and the Rhys D. Fairbairn Co., Simcoe and Pearl streets, destroyed by fire. Los estimated at $250,000; insured.

Factory and warehouse on Don Esplanade burned. Owner, A. B. McColl. Tenants, Frost & Wood (storing implements); Perforated Music Company,

Vancouver, B. C.
Swedish Lutheran Church, corner Carl avenue and Pender street, burned. Pastor, Rev. C. Swanson. Damage estimated at $8,000.

Welland, Ont.
The plant of Electro Steel Plant has been purchased by C. J. Laughlin and A. M. Morley, Welland. Some additional machinery will be required.

New Companies

C. F. McArthur, Ltd., Kenmore, Ont., incorporated with a capital of $50,000, to deal in lumber and all building materials. Provisional directors, Donald A. McArthur, Morgan Warner and John Alex. Carkner, all of Kenmore.

Union Land Company, of Toronto, Ltd., Toronto, Ont., incorporated with a capital of $50,000, to carry on a general land and building business. Provisional directors, Robert D. Hume, Jas. Melton Adam and Harry Dill Auger, all of Toronto.

The Eyer Lumber Co., Ltd., Toronto, Ont., incorporated with a capital of $200,000, to carry on business as lumber and timber merchants, sawmill owners, etc. Provisional directors, John Henry Eyer, Gilbert Samuel Lay and Henry Wright, all of Toronto.

Oliver Reid & Co., Ltd., Toronto, Ont., incorporated with a capital of $40,000, to carry on business as a general land and building company. Provisional directors, John Addison Reid, Wm. McBain, and Jos. Harold Oliver, all of Toronto.

Timber Realization Co., Metropolitan Building, Victoria, B. C., has been incorporated with a capital of $100,000, to carry on lumber and timber business in Michigan, British Columbia or elsewhere Robert S. Babcock, attorney for the company.

Pacific Door Manufacturing Co., 402-6 Pacific Building, 744 Hastings street west, Vancouver, incorporated with a capital of $18,000, to carry on business as sawmillers, lumbermen, etc. John Sutherland MacKay is attorney.

Brooks-McKenzie Lumber Co., Ltd., Penticton, B. C., incorporated with a capital of $25,000, to carry on business as sawmill owners, timber merchants and deal in lumber of all kinds.

Western Box & Shingle Mills, Ltd., Nelson, B. C., incorporated with a capital of $25,000, to carry on business as sawmill, shingle mill and pulp mill proprietors, dealers in timber, logs, ties, crates, boxes, etc.

The O.K. Lumber Co., Ltd., Kelowna, B. C., incorporated with a capital of $100,000, to carry on business as timber and lumber merchants, saw and shingle mill proprietors, etc .

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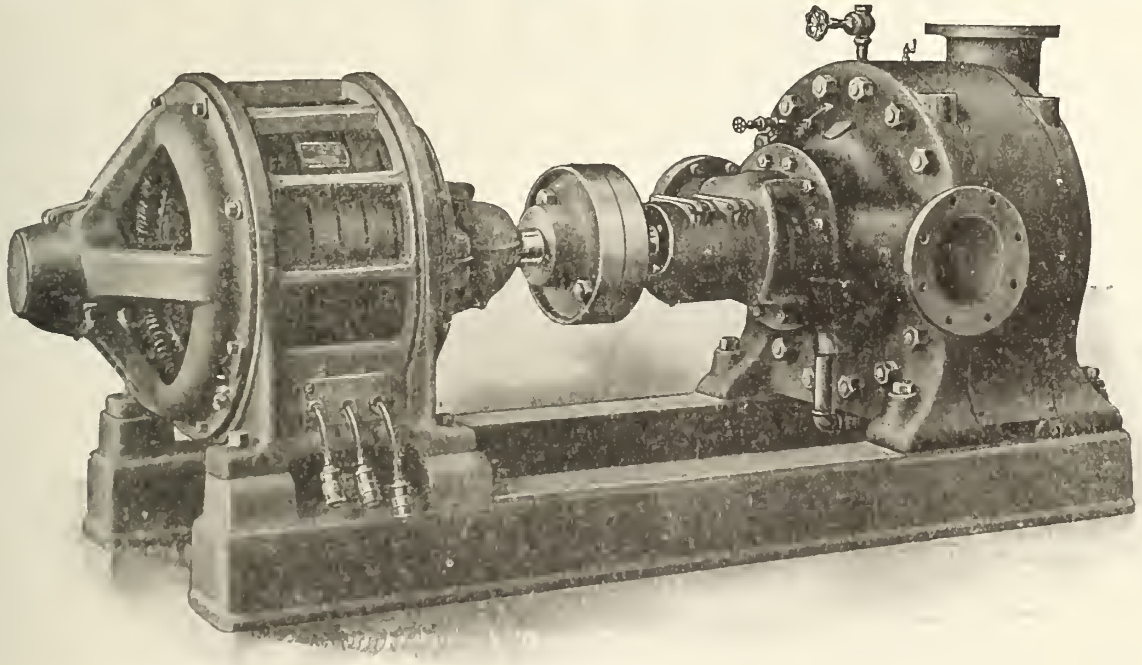

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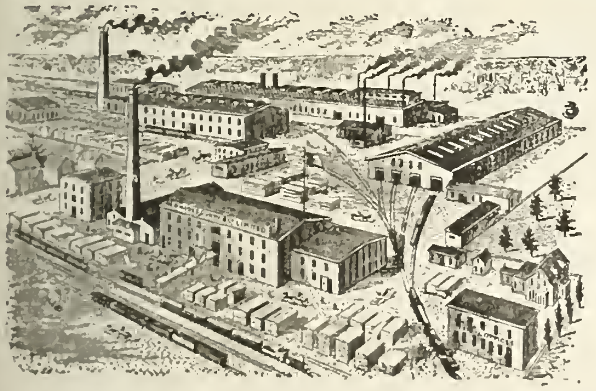

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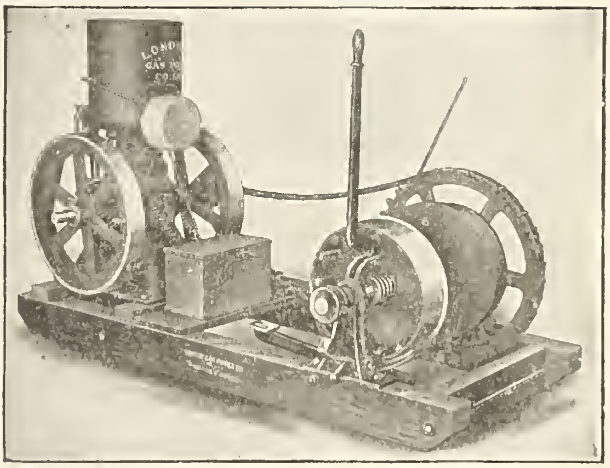

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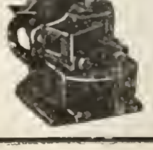

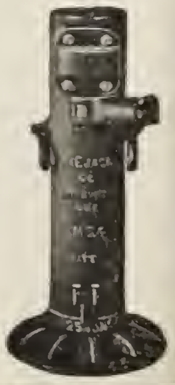

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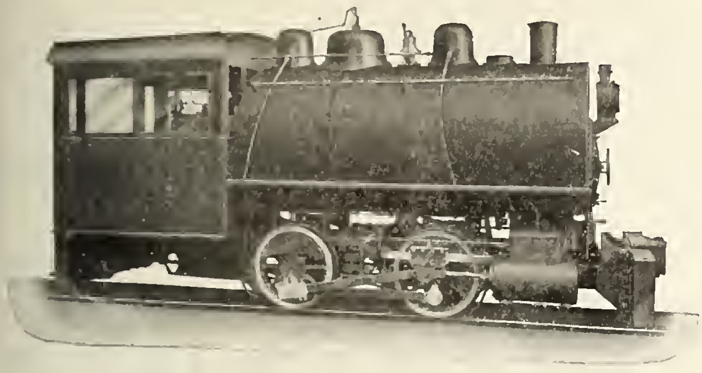

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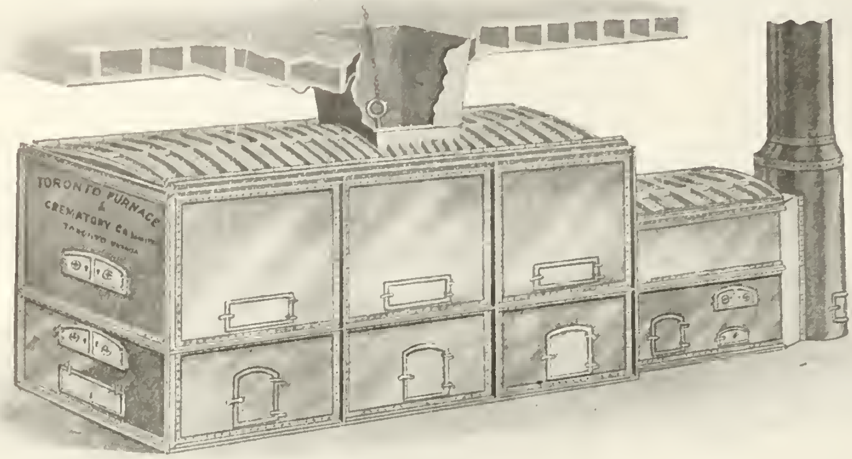
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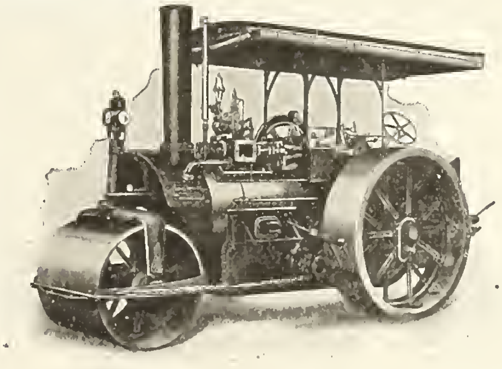

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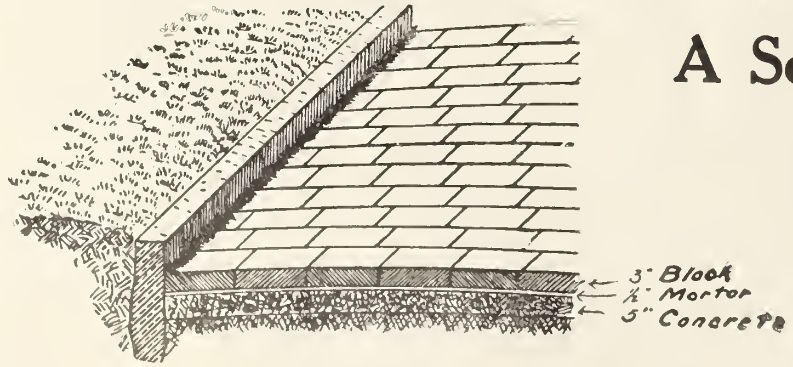

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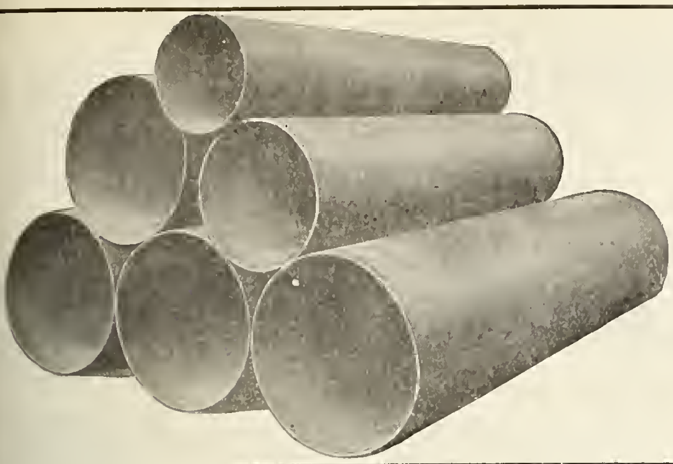

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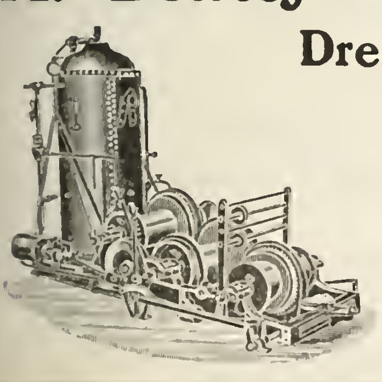

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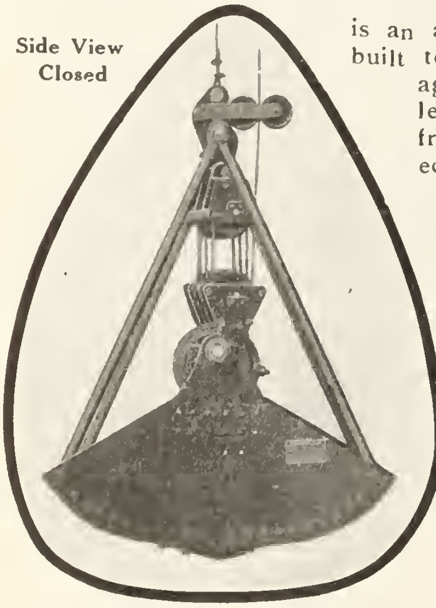

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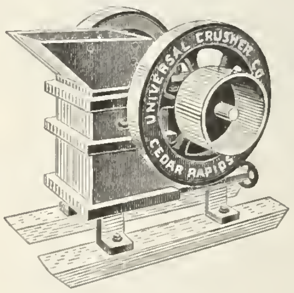

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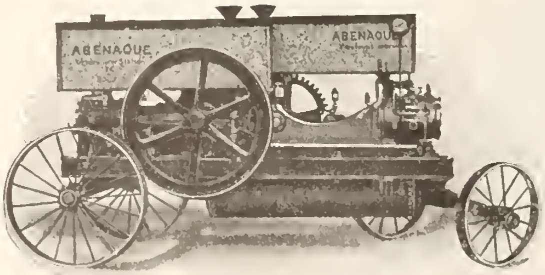

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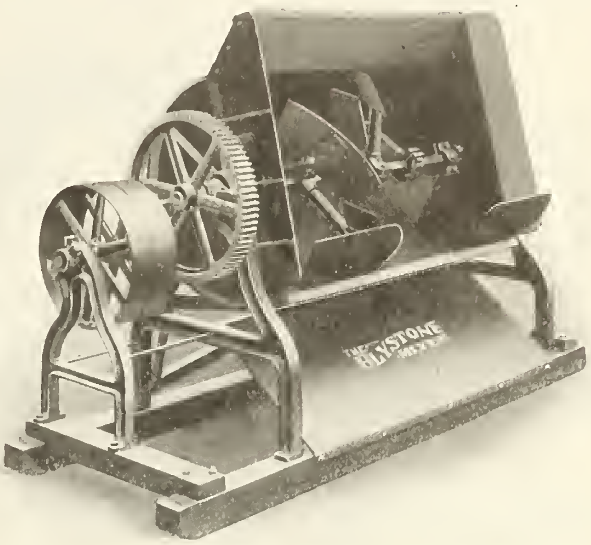

BLYSTONE SKID MIXER

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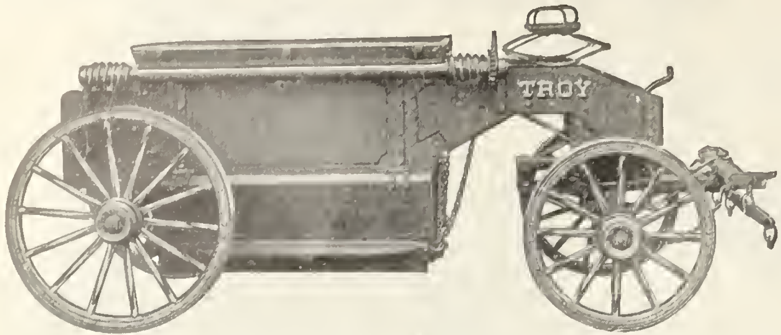

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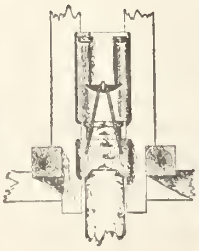
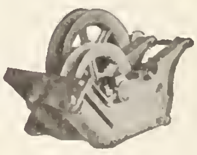


Casgrain Pile Cap



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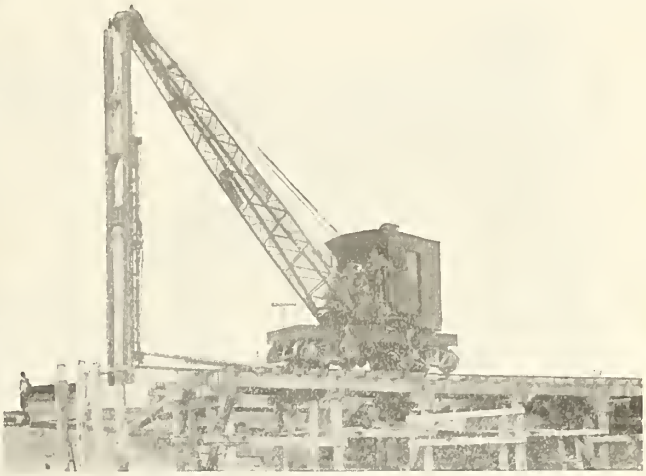

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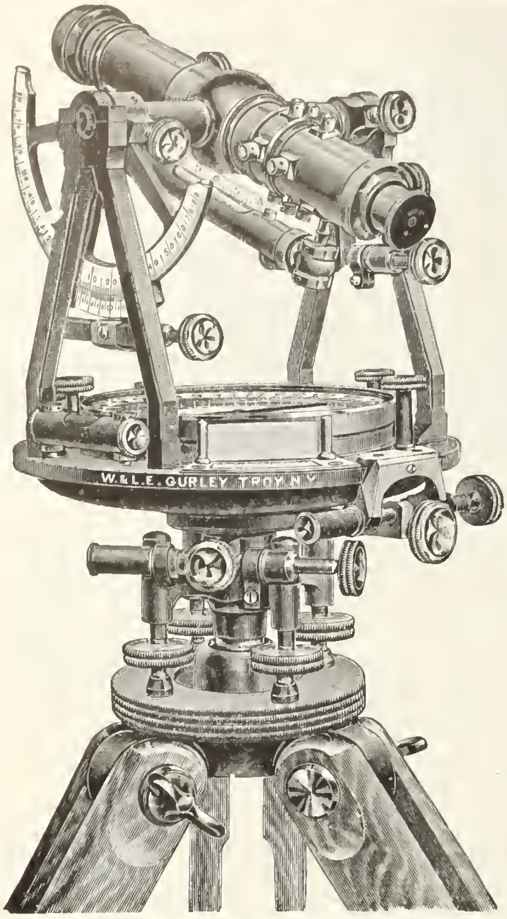
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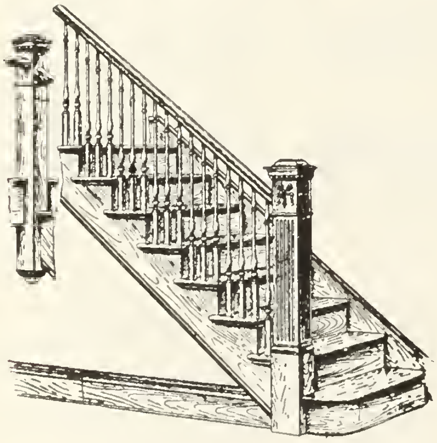

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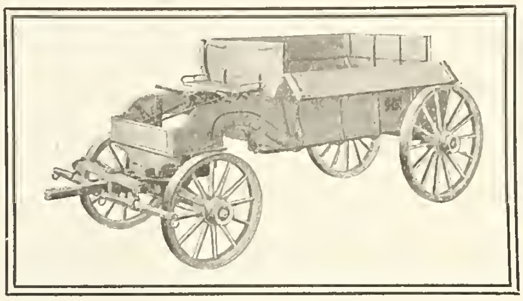

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No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

		Star.	D.D.
10 to 25	united inches........	$4.25	$ 6.25
26 to 40	"	4.65	6.75
41 to 50	"	5.10	7.50
51 to 60	"	5.35	8.50
61 to 70	"	5.75	9.75
71 to 80	"	6.25	11.00
81 to 85	"	7.00	12.50
86 to 90	"	...	15.00
91 to 95	'	...	17.50
96 to 100	"	...	20.50
101 to 105	"	...	24.00
106 to 110	"	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.50	$ 6.75	$ 5.25
40 u. i.	4.25	3.75	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts —Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

BUILDING TILES

(Installed in Toronto)

Floor Tile—Ceramic, any color, ¾-inch square, 1-inch hex., and 3-16-inch round, 55 cents per square foot up.

Floor Tile—½-inch square, 65 cents.

Wall Tile—Rock faced, sizes 6x2 inch, 2x2 inch; colors, buff, grey, granite, red granite, 55 cents per square foot.

Viterous Tile—All sizes, according to color, 55 to 65 cents.

Glazed—White, 6 x 3 inches, 55 cents per square foot.

Matt—Dull finish colors, first, 70 cents.

Capping Coves and Corners, special quotations to suit requirements.

Opalite Tile—3-16 inch No. 1 standard size, 6 x 3 inches, 6 x 2 inches, 60 cents.

White glass, installed, 6 x 3 inches, 30 cents.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 65 per cent.

High grade compression work, 65 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 per cent.

No. 4 compression bath cock ....net $1.65

No. 4½ Fuller's ....net 2.25

Square head brass cocks, 65; iron, 65 per cent.

Heating Apparatus

Hot water boilers, 50 and 10 per cent.; hot water radiators, 50 and 10 per cent.; steam radiators, 50, 10 and 2½ per cent.; wall radiators, 50 and 10 per cent.; specials, such as angles, curves, etc., 25 per cent.

Boilers—Galvanized Iron Range

30-gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

(per 100 ft.)	Black		Galvanized
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.03	⅜ inch	2.86
½ inch	2.63	½ inch	3.48
¾ inch	3.05	¾ inch	4.28
1 inch	4.37	1 inch	6.02
1¼ inch	5.96	1¼ inch	8.21
1½ inch	7.16	1½ inch	9.86
2 inch	9.18	2 inch	12.78
2½ inch	16.10	2½ inch	21.85
3 inch	21.14	3 inch	28.69
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-nch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.70.

Crushed stone, 2-inch, $1.30; 1-inch, $1.30; ⅜-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $10 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 per ton, f.o.b. cars, Toronto siding.

Brown sills and heads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $3.00.

Manilla Rope, best, per pound. 15 cents.

PAINTS AND OILS

(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $6.75 to $7.00 per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, $1.08 per gallon of 9 lbs.

Raw Linseed Oil, in barrels, $1.05 per gallon of 9 lbs.

Turpentine, in barrels, 72c. per gallon.

Pure Red Lead, dry, $5.00 to $6.00 per 100 lbs.

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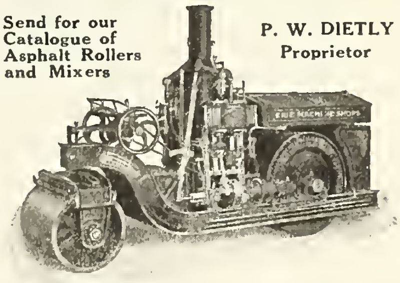

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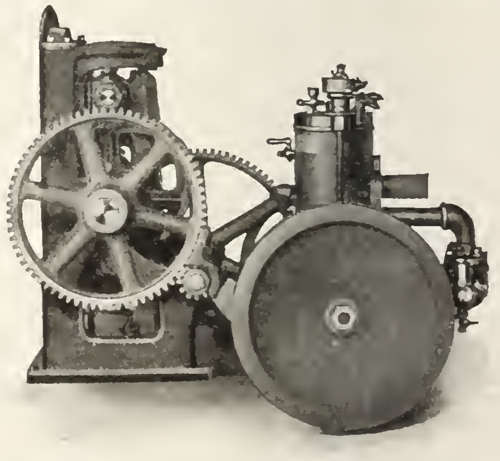

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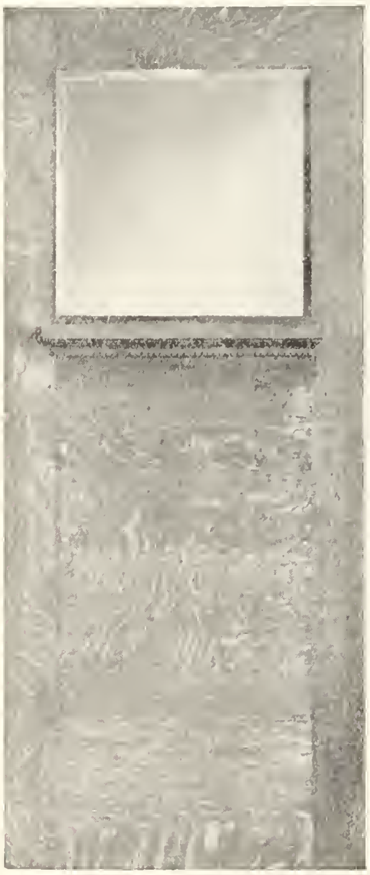

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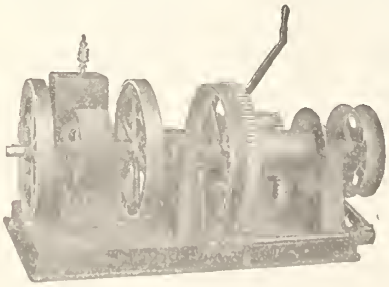

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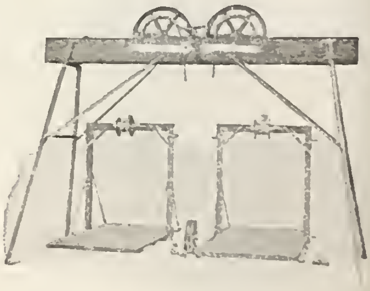

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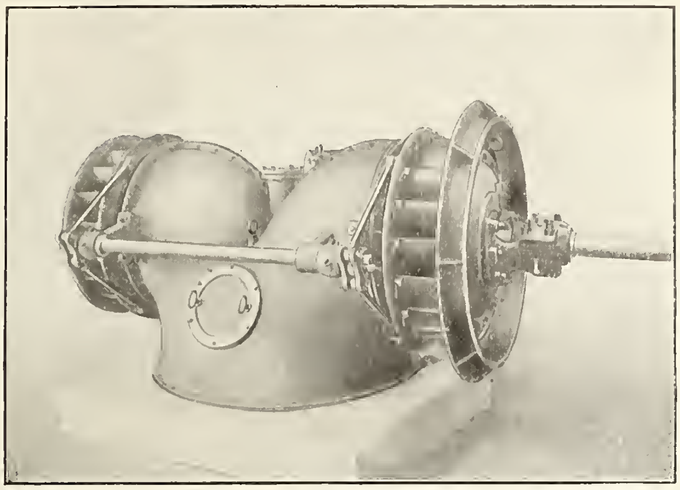

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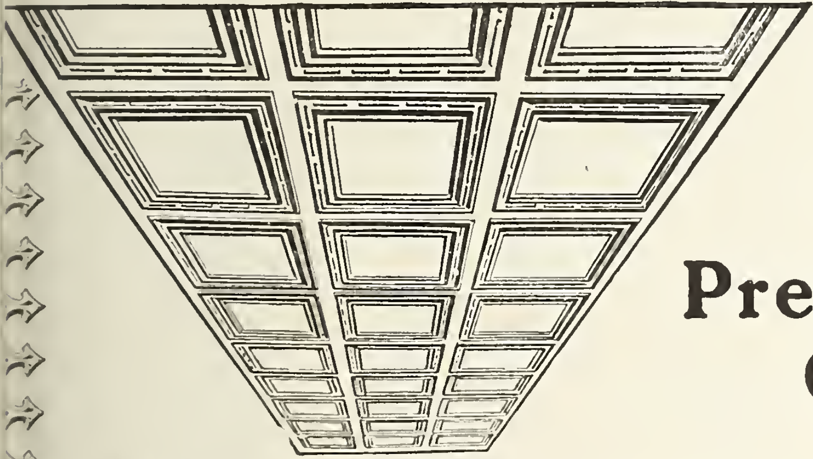

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Waterproofs Concrete and Cement Mortar

Ceresit is a creamy white paste that any workman can readily dissolve in the water which is to be used in mixing the concrete or cement mortar as the case may be. This water then carries the Ceresit into the mass during the mixing operation and distributes it uniformly throughout the elements, thus making the concrete more dense. Ceresit does not affect the tensile strength of cement. When the Ceresitized concrete is set it is one solid mass—waterproof through and through, uniformly and permanently. It is proof against water penetration as long as the concrete stands.

Do not compare Ceresit with washes and paints, sold for waterproofing, which disintegrate with the lapse of time.

Ceresit, by keeping water out of concrete or cement mortar, prevents disintegration by frost.

Ceresit does not alter the color of concrete or cement work in which it is incorporated.

Write for Book S today. It tells all about Ceresit waterproofing. Ceresit is catalogued in "Sweet's Index." Ceresit is used in all civilized countries. See our exhibit at the Cement Shows. Booth 22, New York Cement Show. Booth 130 Chicago Cement Show.

CERESIT WATERPROOFING CO. Commercial National Bank Building, CHICAGO

Ceresit Factories are located in Chicago, Unna Westphalia, Germany, London, Paris, Vienna, St. Petersburg.

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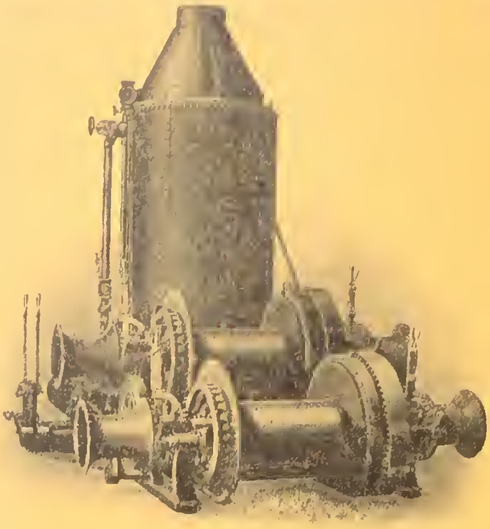

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We can furnish hoists designed to suit every purpose; our hoists give the maximum results with a minimum cost.

Steam - Belt Driven and Electric HOISTS

of all capacities for prompt shipment

Centrifugal Pumps

either with direct connected engine or belt driven

We carry all sizes of centrifugal pumps in stock ready for immediate shipment.

Derricks Concrete Mixers Crushers

F. H. Hopkins & Co.

MONTREAL

BRANCH OFFICES : General Supply Company of Canada, Ltd., Winnipeg Agents
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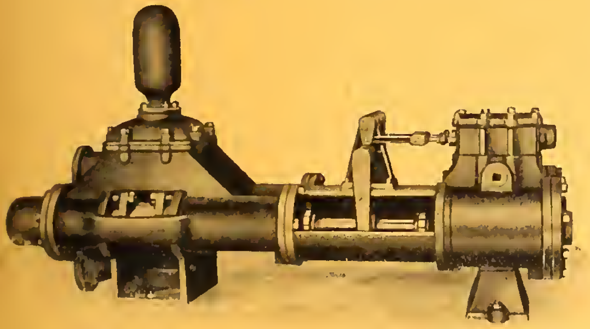
ESTABLISHED 1886

Contract Record and Engineering Review



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Made in all Kinds of Glass on Short Notice

Large Bent Plate Glass for Shop Fronts a Specialty

The Toronto Plate Glass Importing Company, Limited
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"Redcliffe"

Corrugated Iron

Gets the Preference when Quality Counts

John Lysaght, Limited
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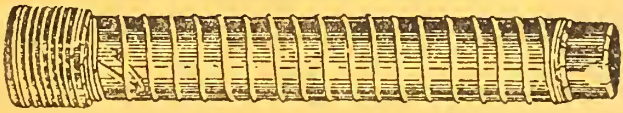

Continuous and Machine Banded Wood Stave

WATER PIPE

RESERVOIR TANKS

for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

Pacific Coast Pipe Co., Limited
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Office and Factory, Granville St., near High Bridge
WRITE FOR CATALOGUE
Full Particulars and Estimates Furnished

lphabetical Index of Advertisers, Page 16

Classified Directory to Advertisements, Page 6

Horizontal Tubular Boilers

Built for any Working Pressure Desired

WE CARRY IN STOCK A COMPLETE RANGE OF SIZES

Also Vertical and Locomotive Types.

Price on Application

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THE VERY FIRST THING

that Contractors, Engineers, Quarrymen, etc., speak of when they see

"AMERICAN" DERRICK IRONS

IS THEIR EXCELLENT APPEARANCE

After much experience these people tell us that

No better or longer wearing castings could be made

Black Rock Harbour Improvement near Buffalo, N.Y.
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There are no putty filled holes painted over to cover up defects. They will do more than is expected of them **all the time**

They only cost a few dollars more than others.

It will be worth your while to get full and complete information from us on details that may affect your profits.

WRITE US FULLY.

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American Hoist & Derrick Co., St. Paul, Minn.
Please send us Prices and Information
on "AMERICAN" Derricks.
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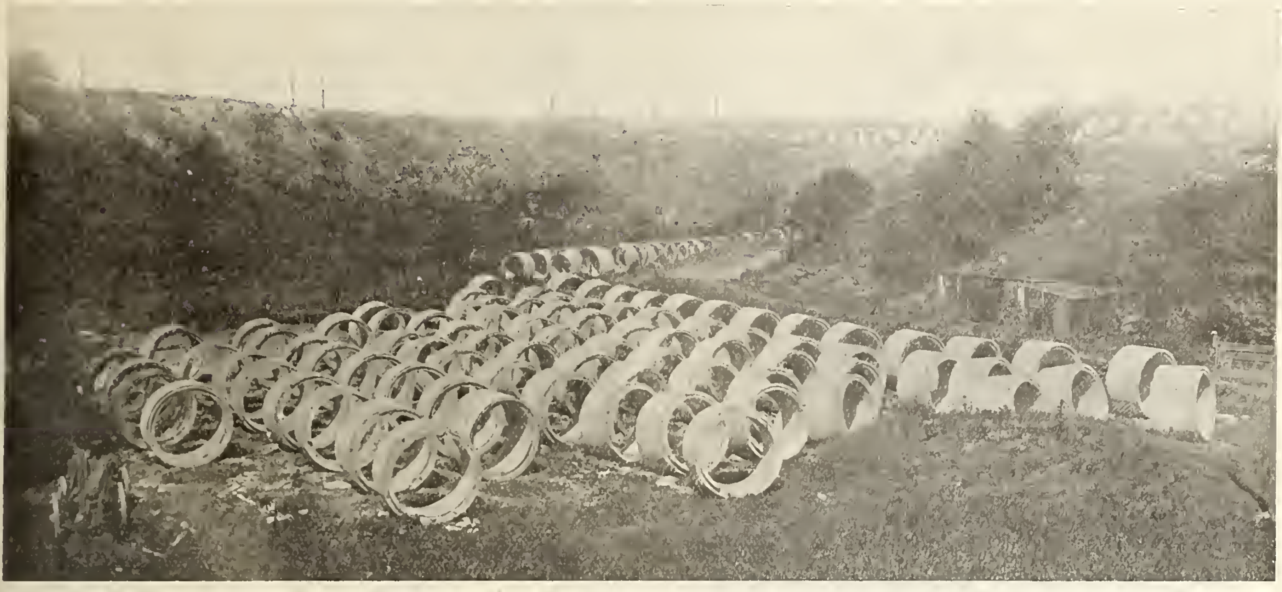

REINFORCED CONCRETE SEWER PIPE. VIEWED FROM C. P. R. TRACK, HAMILTON

If It Passes Our Tests, It Will Meet Your Needs

There is no longer any question about the suitability of concrete for the making of sewer pipes, drains or any work that has to withstand the corrosive effects of acids or the damages inflicted by frost and water.

Reinforced concrete, **properly made,** has been successful in the most rigid tests and is now the recognized material for all important work.

Properly made concrete, means, not only thoroughly mixed and the right proportions of cement, aggregate and sand—it also means that the cement used, be of the highest standard of purity.

The pipes shown here were made in Hamilton, Ont., by the REINFORCED CONCRETE PIPE CO. of JACKSON, MICH. They have made pipes for some of the most important work done, both in the United States and Canada and they now use "Canada" Cement exclusively.

THE REINFORCED CONCRETE PIPE CO., report that although they have, on one piece of work, used cement from no less than five of our mills, they could see no difference in the quality of the cement or in the work produced. That is what the "Canada" Brand stands for:–absolute purity and absolute uniformity.

Canada Cement Co., Limited

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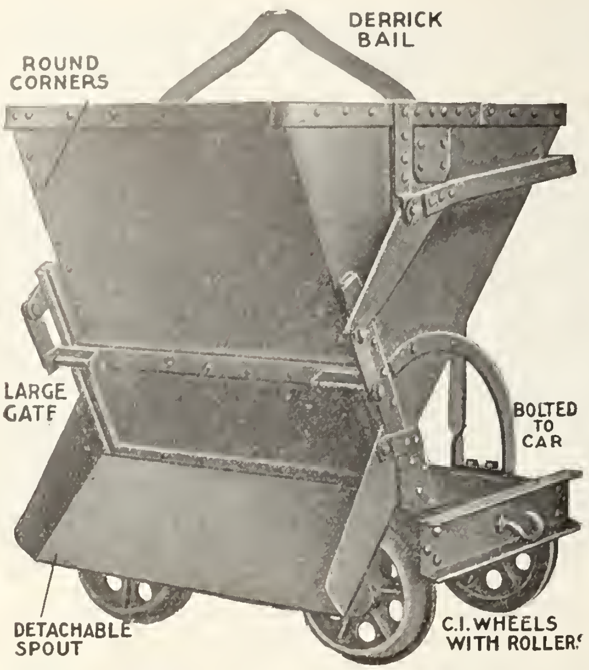
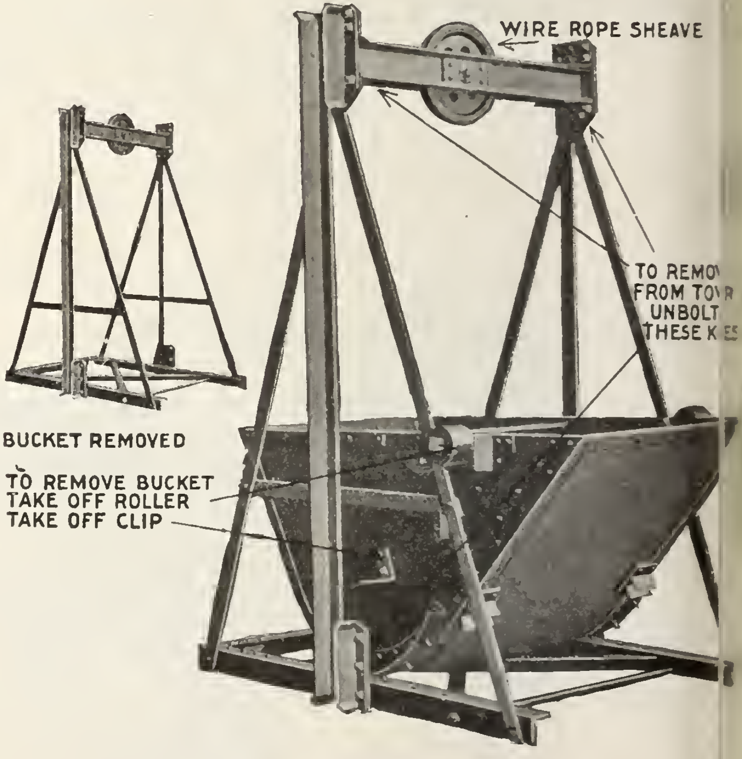


Concrete Equipmen

For the Modern Contractor


WIRE ROPE SHEAVE
TO REMO FROM TO R UNBOLT THESE K ES
BUCKET REMOVED
TO REMOVE BUCKET TAKE OFF ROLLER TAKE OFF CLIP

Side Discharge Cars
Roller Hoists
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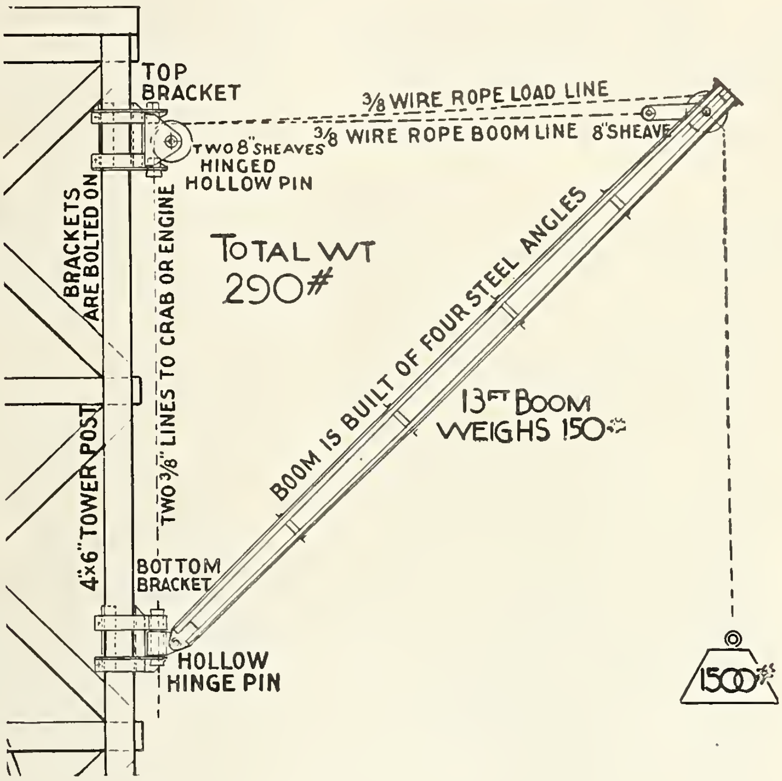

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Smith Hand Mixers

Full and Complete Assortment of

Wheelbarrows, Carts, Concrete Spades and Tampers

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(Continued on page 12)

DON VALLEY BRICKS

Residence of Mr. J. C. Eaton, Toronto. Messrs. Wickson & Gregg, Architects

Don Valley Porous Terra Cotta Fire Proofing, Foundation Bricks, Facing Bricks and Enameled Bricks Exclusively Were Used in This Structure

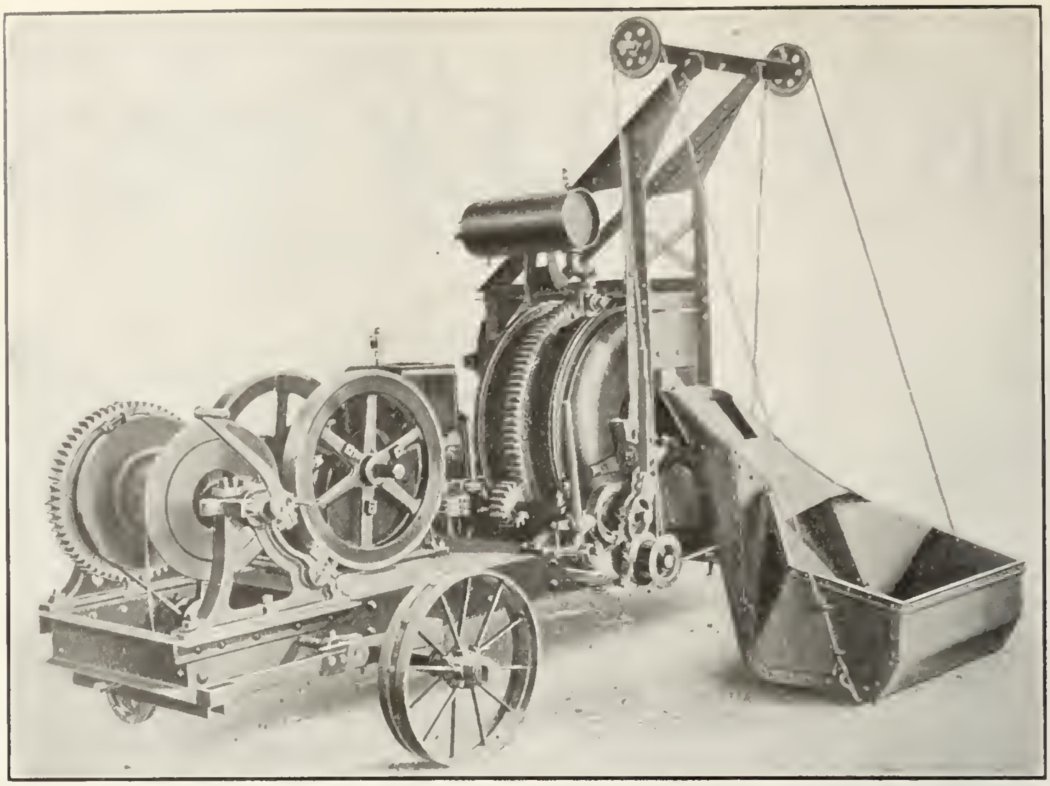
¶ These bricks have been the unanimous choice of discriminating architects and owners in competition with samples submitted by the leading brick firms of Canada and the United States. They are the only thoroughly vitrified facing bricks ever manufactured in the Dominion, and the most exclusive high-class pressed brick on the American continent.

¶ The above view is an illustration of one of the many important buildings in which this product is used.

THE DON VALLEY BRICK WORKS

Head Office: 36 Toronto St., TORONTO

Montreal Agent: **David McGill, 83 Bleury Street**



M-C Rail Track Mixer combined with Contractors Hoist. Gasoline Motor Driven.

Most Mixing Least Fixing

The Mixer with Details that Do Count

Most Mixing Least Fixing

STUDY THEM

The solid steel standard railroad rail trunnions absolutely eliminate any scalloping or breaking through the drum.

The main drive gear is in five interchangeable sections. A few minutes time will replace any one of them with a new fifth should a tooth break. No delay. Minimum expense.

The M-C Standard Rig can be equipped with elevating charging hopper in the field. This is true of no other mixer on the market.

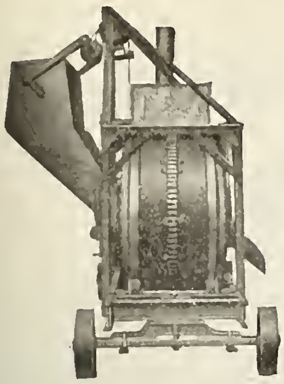
There are no bevel gears in the M-C mechanism—all spur gears of heavy semi-steel.

All these and many more exclusive features of the M-C line mean increased output and practically NO repair bills. So think 'em over and

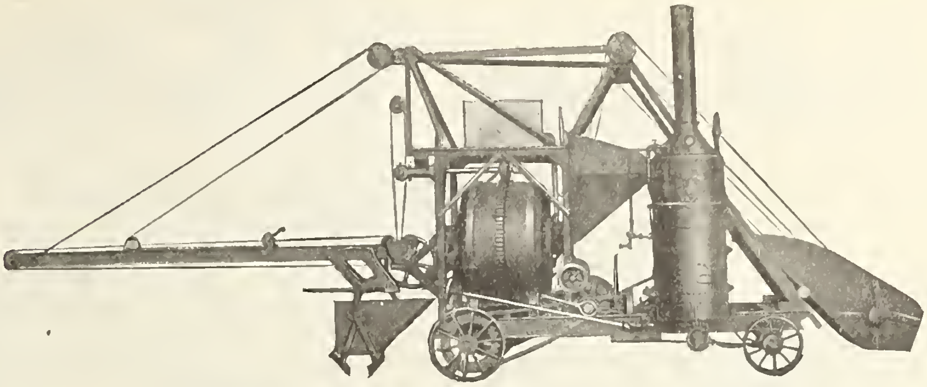
Get the Catalog Get the Catalog Get the Catalog

THE FORD IRON COMPANY

MONTREAL LIMITED



London Standard Drum Batch Mixer



London Street Paving Mixer with front board and delivery boom

Before you Buy Machinery or Equipment of any kind

write to us for our 1912 CATALOGUE. It will save you TIME and MONEY. Do you know that we are the ONLY LARGE MANUFACTURERS who specialize on

Concrete Machinery and Contractors' Equipment

The following is a few of our lines

LONDON STANDARD DRUM BATCH MIXER in Five sizes any kind of Power or Equipment.

DRUM PAVING MIXER with Forward Loader and Rear Discharge.

DRUM PAVING MIXER with Side Loader and Rear Discharge.

AUTOMATIC BATCH MIXER Two sizes any kind of Power.

MORTAR MIXERS.

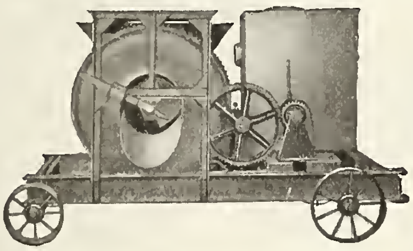
HAND POWER CONCRETE MIXERS.

TILE MOULDS.

CEMENT BLOCK MACHINES.

CEMENT BRICK MACHINES.

CEMENT TILE MACHINES.



London Standard Drum Batch Mixer

SIDE WALK TILE MACHINES.

SILL STEP and **WINDOW CAP MOULDS.**

ORNAMENTAL MOULDS.

ROCK CRUSHER.

SCREEN and **ELEVATORS.**

MASON'S SAND.

SCREENING MACHINE.

GASOLINE ENGINES.

PUMPING OUTFIT.

GASOLINE HOISTS.

SIDEWALK FORMS.

MATERIAL ELEVATORS.

DRIERS both Portable and Stationary

FENCE POST MOULDS.

CONCRETE CARTS.

WHEELBARROWS.

And a complete line of Cement Working Tools.

London Mortar Mixer

London Automatic Batch Mixer No. 2

London Concrete Machinery Co. Limited

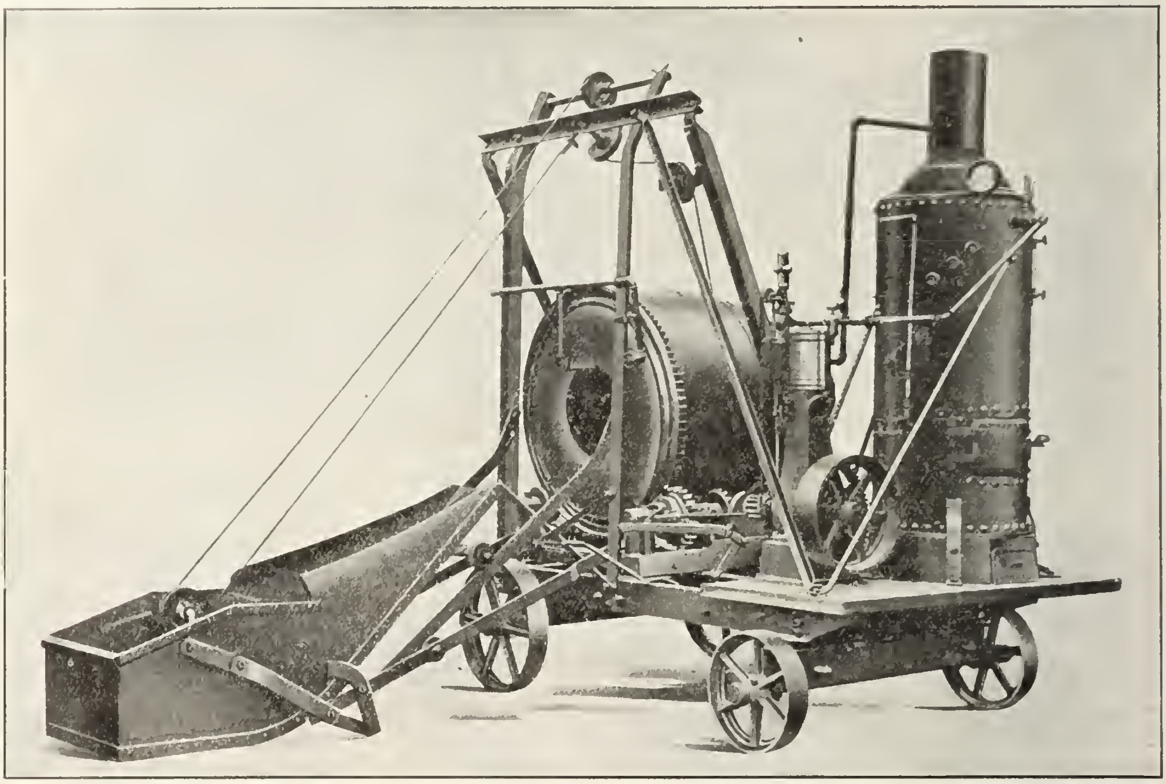
Cabell St. and Kitchener Ave., LONDON, ONT.

AGENTS.

G. B. Oland & Co., 28 Bedford Row, Halifax, N.S.

Foss & Hill Machinery Co., 329 St. James St., Montreal

It will mean a "Wettlaufer Heartshape" in the end---Why not now?



The purchase of a reliable mixer of recognized make at the outset of a contract will save you money and time all along the line.

The present Wettlaufer Heartshape Mixer is the ultimate result of many years' experience, untiring experiment and hard practical work. Experience not only in the construction of the mixer but also in its operation.

We have taken contracts for all kinds of cement work and we know just what a mixer should do.

It is the renowned HEARTSHAPE DRUM that makes the Wettlaufer so efficient and popular, for it is the HEARTSHAPE DRUM that does the trick of thorough and speedy mixing and quick discharging.

This HEARTSHAPE DRUM is simple in design and therefore easy to clean and will cost nothing for repairs. Moreover, we guarantee every Mixer for one year against breaks from defective material.

In offering the Heartshape Mixer to the Building Trade we honestly affirm we are giving the Builder the greatest possible value obtainable in a concrete mixer.

The NEW HEARTSHAPE MIXER shown in the above cut is fitted with the improved device which dumps the drum automatically or as required This mixer is equipped with engine and boiler and is especially built for ROAD WORK of all kinds, sidewalk and construction work. Built on an all steel frame it is solid and very compact and is convenient where only small space is available. The power can be steam, electric or gasoline—according to requirements.

Catalogue and prices on request.

Wettlaufer Brothers

178 Spadina Avenue, Toronto

STANDARDIZED Portland Cements of *high strength*, *eveness of set* and *uniformity* of action may be had by specifying Rogers Brand on *heavy* or *light* construction, the runs being constantly checked up at our mills, with *rigid* care in every *detail.* A feature of our Portland Cement is the *great capacity* in binding aggregates in the bulkier mixtures, due to the excellent *quality* and *fineness* of our product.

Specification by architects, engineers and contractors of Rogers Brand Portland Cement results in *extra strength* of concrete *speedy* construction, and *stability and permanence* of the finished work, especially in the *bulkier* concretes. Contractors have available *reserve* stock at *near-by* points for *prompt* delivery. These *special* Rogers organization advantages make for *complete satisfaction* and *maximum profit.* Rogers *service* is a feature that assists all parties contemplating work in Portland Cement Concrete.

Our Mills are located at Atwood, Durham, Hanover,
Kirkfield, Orangeville, Owen Sound and Wiarton.

Alfred Rogers Limited

28 West King Street, TORONTO

N. J. Dinnen & Co., Western Sales Manager, Winnipeg

2

CLASSIFIED INDEX TO ADVERTISEMENTS—Continued

Pumps and Pumping Machinery
(Continued from page 6)
McDougall Caledonian Iron Wks
Mussens Limited
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Waterous Engine Works Co.

Quarry Machinery
Canadian Rand Co.
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Steel Co. of Canada
Steel & Radiation
Trussed Concrete Steel Co.
Turner, C. A. P.

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Greening Wire Co., B.
Johnson & Chapman Company

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Erie Machine Co.
Ford Iron Co.
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Mussens Limited
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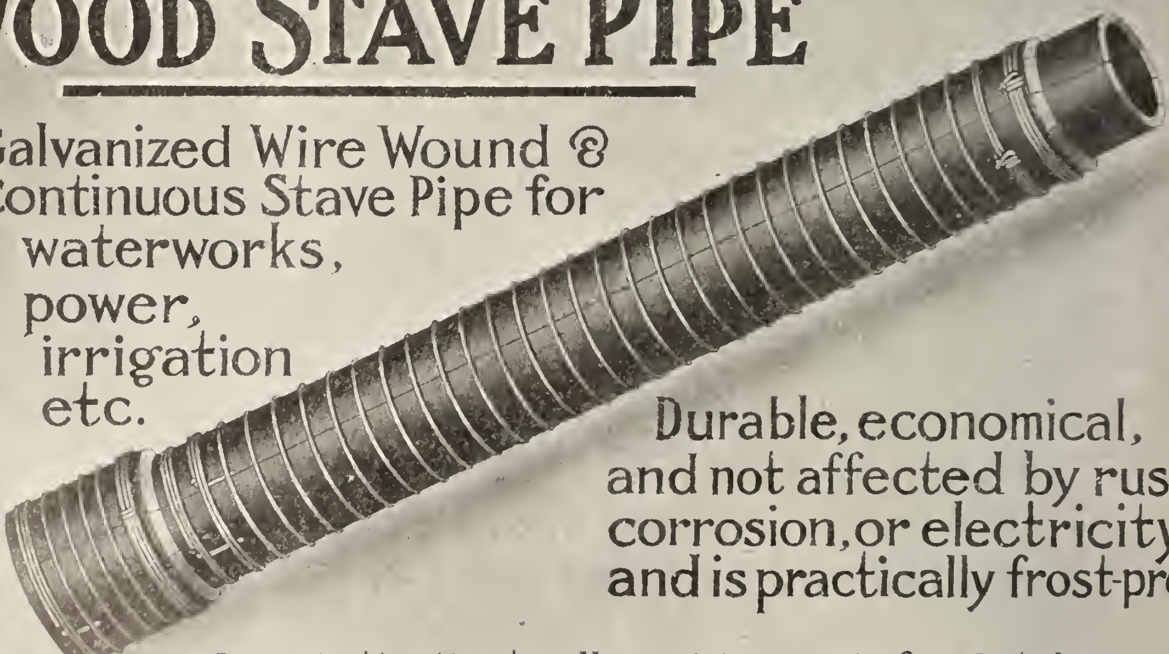

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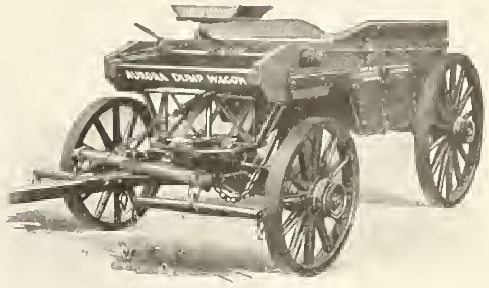

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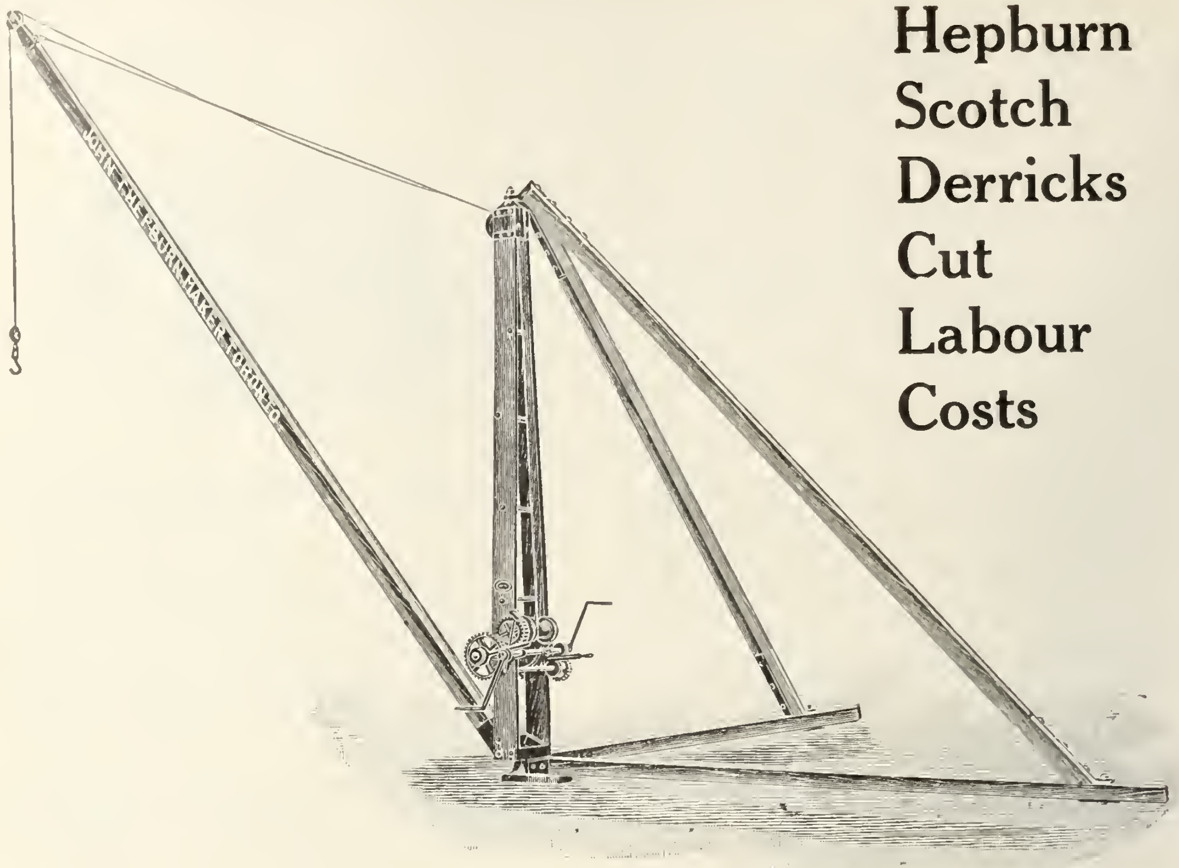
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Ainsworth & Sons, Wm. 25
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Ambursen Hydraulic Construction Co. of Canada, Limited 76
American Enameled Brick & Tile Co.
American Hoist & Derrick Co. 2
American Water Softener Co. 88
American Spiral Pipe Works 79
American Well Works 23
Anderson & Co., 1905 Ltd. George 22
Andresen, H. P.

Bain & Ross 92
Bates & Edmonds Motor Co. 94
Batts Limited
Beatty & Sons Limited, M. 79
Beckman Co., L. 85
Bell Filtration Co. of Canada, Ltd. 32
Bennett, Robert
Berg Manufacturing Company
Blystone Manufacturing Company 81
Bowman & Connor 92
Bremner Limited, Alex. 91
Britnell & Co., Ltd. 86
Brodie & Company, James
Brown Hoisting Machinery Co. 83
Browning Engineering Company
Buffalo Meter Co. 27
Business Systems Limited 75
Bryan Manufacturing Company

Canada Cement Co., Ltd. 3
Canada Foundry Co., Ltd. 20-69-97
Canada Iron Corporation Limited 91
Canada Steel Co. 80
Canada Wire & Cable Co. 94
Canada Wire & Iron Goods Co. 32
Canadian Boving Company 30
Canadian Bridge Co., Ltd. 88
Canadian Fairbanks-Morse Co., Ltd. 22
Canadian Kellogg Co. 33
Canadian Office and School Furniture Company, Limited
Canadian Norcross Bros. Co. 18
Canadian Pipe Co., Ltd. 90
Canadian Rand Co., Ltd. 73
Canadian Supply Company
Carey Mfg. Co., Philip 79
Cement Era Publishing Co. 72
Ceresit Waterproofing Company
Chipman & Power 92
Christie Henderson & Co. 86
Cleveland Bridge & Engineering Co., Ltd. 88
Cloisonne Glass Co. of Canada 68
Colonial Glass Co. 68
Cook, A. D. 72
Commercial, The 87
Conduits Company, Limited 91
Consolidated Glass Company
Consolidated Optical Co., Ltd. 84
Consolidated Stone Co. 68
Consumers' Gas Company 76
Contractors' Supply Co., Ltd. 86
Crushed Stone Limited 75
Corinthian Stone Co. 24

Dahlstrom Metallic Door Co.
Dennis Wire & Iron Works Co., Ltd. 90
Des Moines Bridge & Iron Co. 79
Dickson Bridge Works Co., Ltd.
Doolittle & Wilcox Limited 91
Dominion Bridge Co., Limited 88
Dominion Creosoting Company 29
Dominion Marble Co., Ltd. 21
Dominion Sewer Pipe Co., Ltd. 21
Dominion Wood Pipe Co., Limited 12
Don Valley Brick Works 7
Down Draft Furnace Company 70

Eadie-Douglas Limited
East Iron & Machine Co. 78
Eastern Pipe & Construction Co., Ltd. 70
Eaton & Co., T. 85
Erie Machine Shops 74

Factory Products Limited 33
Farmer, John T. 92
Ferguson, H. S. 92
Ford Iron Company, Limited 8
Foundation Company
Fuce, Edward O. 92

Galt Art Metal Co., Limited 72
Galt Engineering Co., John 92
Gartshore, John J. 92
Gartshore-Thompson Pipe & Foundry Co., Ltd. 90
General Machinery Co., Ltd.
Georgian Bay Shook Mills, Ltd.
Gibb, Alexander 85
Goodyear Tire & Rubber Co. of Canada, Ltd. 31
Greening Wire Co., Ltd., B. 93
Guarantee Company of North America 92
Gurley, W. & L. E. 84

Hagerville Contracting Co., Ltd. 13
Hamilton Pressed Brick Co.
Hamilton Machinery Co., Ltd. 26
Hancock, Jr., H. Syd. 92
Harvey, J. 87
H. & E. Lifting Jack Co.
Heinicke Inc., H. R.
Hepburn, John T. 14
Hobbs Manufacturing Co., Ltd. 68
Holmes & Sons, Fred
Hopkins & Company, F. H. 100
Hunt & Company, Robert W. 92
Hunter Bridge & Boiler Co., Ltd. 89

Imperial Wire & Cable Co., Ltd. 99
Inglis Company, John 69
International Marine Signal Co., Ltd. 17

Jamieson Lime Company
Jenckes Machine Company, Ltd. 2
Johnston, A. H. 82
Johnston & Chapman Company

Kennedy, James C. 92
Kerr Engine Co., Ltd. 95

Laurentian Granite Co., Ltd. 92
Lea, R. S. 92
Leach Concrete Company
Leonard & Sons, E. 75
Leslie & Co., Ltd., A. C.
London Concrete Machinery Co., Ltd. 11
London Gas Power Co., Ltd. 71
Luxfer Prism Company 93

Mace, T. Harry 92
MacKinnon Holmes & Co., Ltd.
MacLean Daily Reports 81
Marsh & Henthorn Limited 71
McCoy Company, Henry J. 25
McDougall Caledonian Iron Wks. Co., John 69
McIlwraith, James A. 92
McMillan & Sons, W. N.
McNally & Co., William 89
Meadows, George B. 33
Metal Shingle & Siding Co.
Metallic Roofing Co., Ltd. 71
Metropolitan Paving Bricks Co. 74
Miller & Co., George M.
Mitchell, Chas. H. & Percival H. 92
Mitchell Company, Ltd., Robert 72
Mississquoi Marble Co., Ltd. 82
Montreal Locomotive Works, Ltd. 75
Morrison & Co., T. A. 92
Munderloh & Co., Ltd. 13
Mussens Limited 4
Myers, Oakley 75

National Bridge Co., of Canada, Ltd. [illegible]
National Iron Works Ltd. 91
Neptune Meter Co. 27
Noble, Clarence W. 78
Northwestern Terra Cotta Company 83

Ontario Asphalt Block Co., Limited 78
Ontario Lime Association Limited 77
Ontario Sewer Pipe Co., Ltd. 26
Ontario Wind Engine & Pump Co., Ltd. 75
Ormsby, Ltd., A. E. 13
Owen Bucket Co. 90

Pacific Coast Pipe Co., Ltd. 1
Page Wire Fence Co., Ltd. 85
Patterson Manufacturing Co.
Pedlar People Limited 90
Phoenix Bridge & Iron Works, Limited 89
Port Credit Brick Co., Ltd. 90
Power & Son
"Prime White" Road Oil Co. 98
Pyle-National Electric Headlight Co. 19

Queenstown Quarry Co., Ltd. 91

Reid & Brown 92
Rhodes Curry Company, Limited 71
"R. I. W." Damp Resisting Paint Co. 19
Rogers Limited, Alfred 9
Rogers Supply Company 25
Roman Stone Co., Limited 15
Rouleau, Jos. N. 92

Sackville Freestone Co., Ltd. 17
Sand & Supplies, Ltd 89
Sarnia Bridge Co., Ltd. 89
Shawmut Vitrified Paving Brick Works
Sheppard & Sons, Jas. 72
Smart-Turner Machine Co., Ltd. 1
Smith Limited, Thos. & Wm. 96
Smyth & Ryan 86
Standard Drain Pipe Co., Ltd. 21
Standard Foundry & Machine Co.
Standard Ideal Co., Ltd. 34
Steel Company of Canada 30
Steel & Radiation, Ltd. 28
Steward, A. P. 74
Stinson-Reeb Brilders' Supply Co. 34
Sturtevant, B. F. 81

Taylor, J. & J. 79
Taylor, Hogle & Davis
Tide Water Iron Works 77
Thew Automatic Shovel Co., The 74
Thompson & Co., B. & S. H. 21
Toronto Furnare & Crematory Co. 76
Toronto Plate Glass Importing Co., Ltd. 1-83
Troy Wagon Works Co. 82
Trussed Concrete Steel Co. 68
Turner, C. A. P. 70

Union Water Meter Co. 27
Universal Crusher Co. 80

Vining Manufacturing Co. 74
Vulcan Iron Works 82

Wadsworth Howland & Co., Inc. 79
Waterous Engine Works Co., Ltd. 77
Watson Wagon Company 85
Weeks, Arthur L. 92
Wells & Gray, Ltd. 34
Western Canada Contractor 86
Western Wheeled Scraper Co. 13
Wettlaufer Bros. 19
Whitehead & Co., Ltd., John 30
Wilson Bros., Ltd. 94
Woods Limited 27
Wyss & Co., Escher 95

York Sand & Gravel Co. 86

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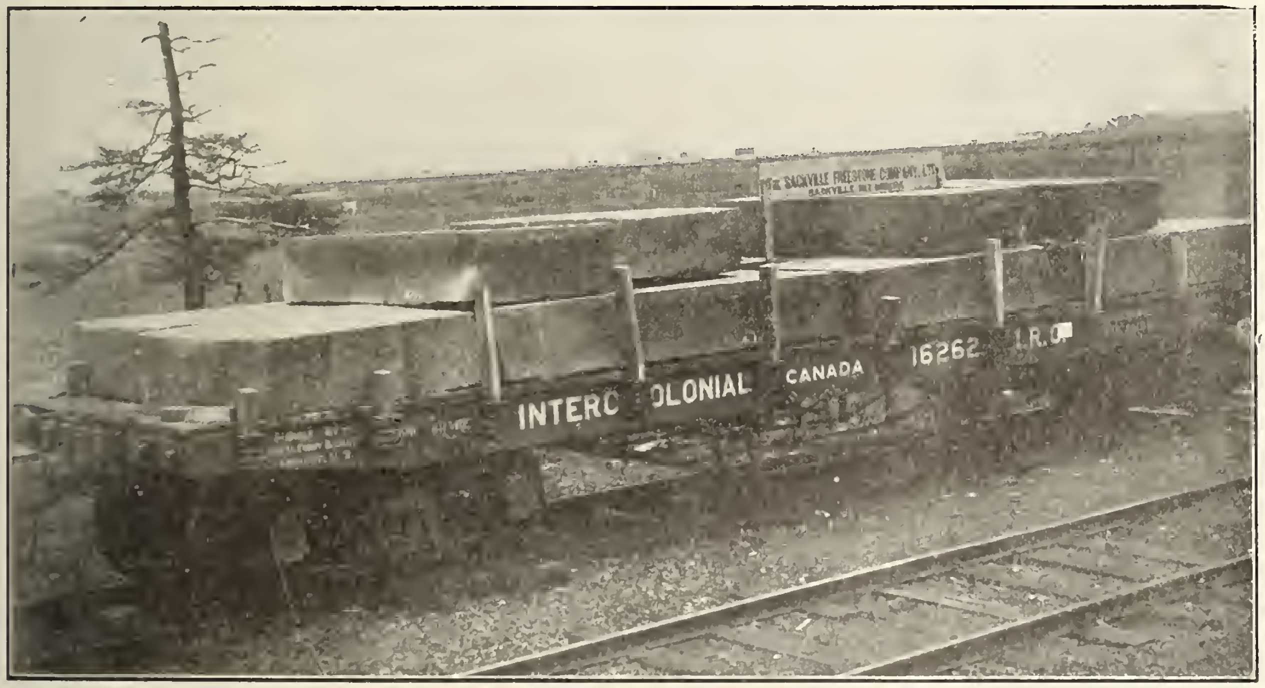

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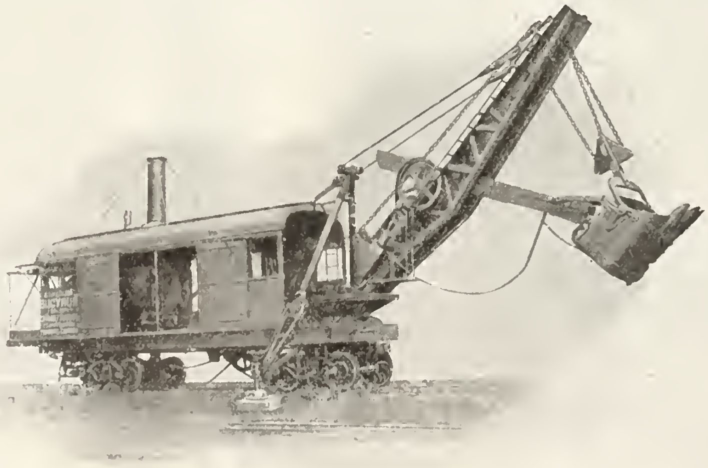

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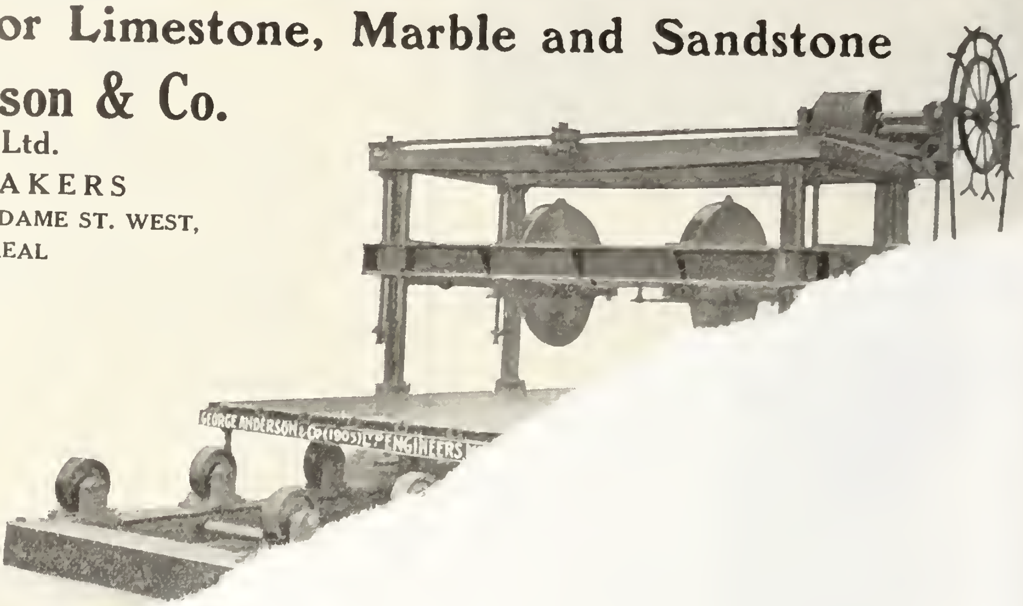

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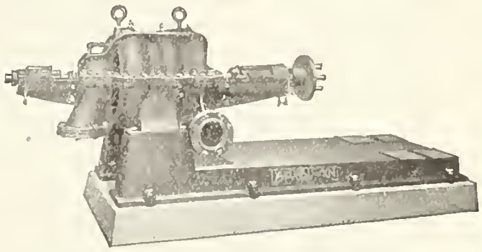

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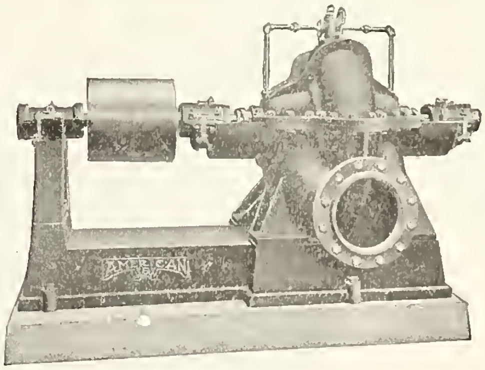

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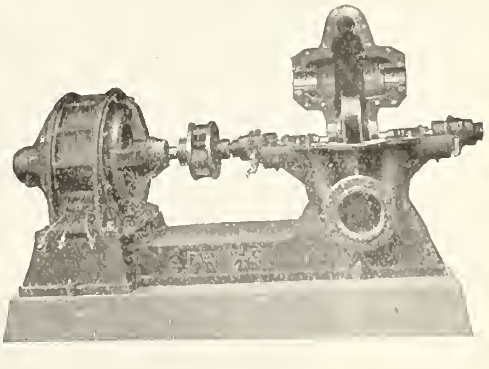

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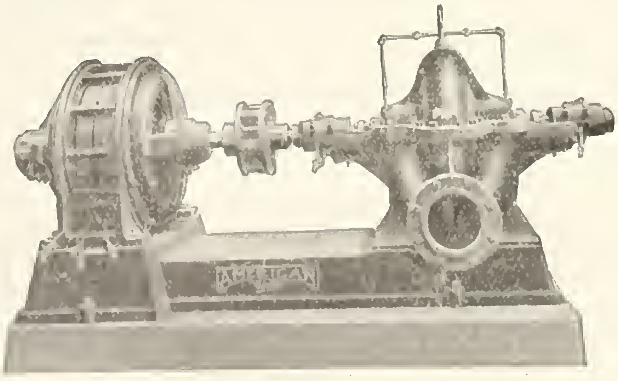

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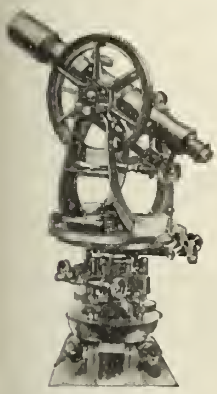

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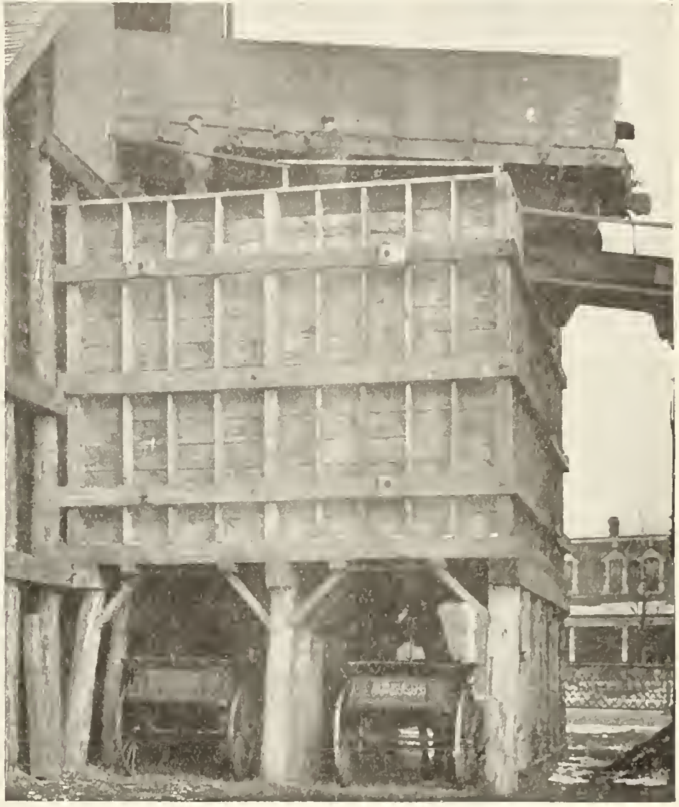

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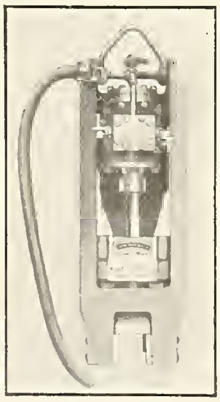

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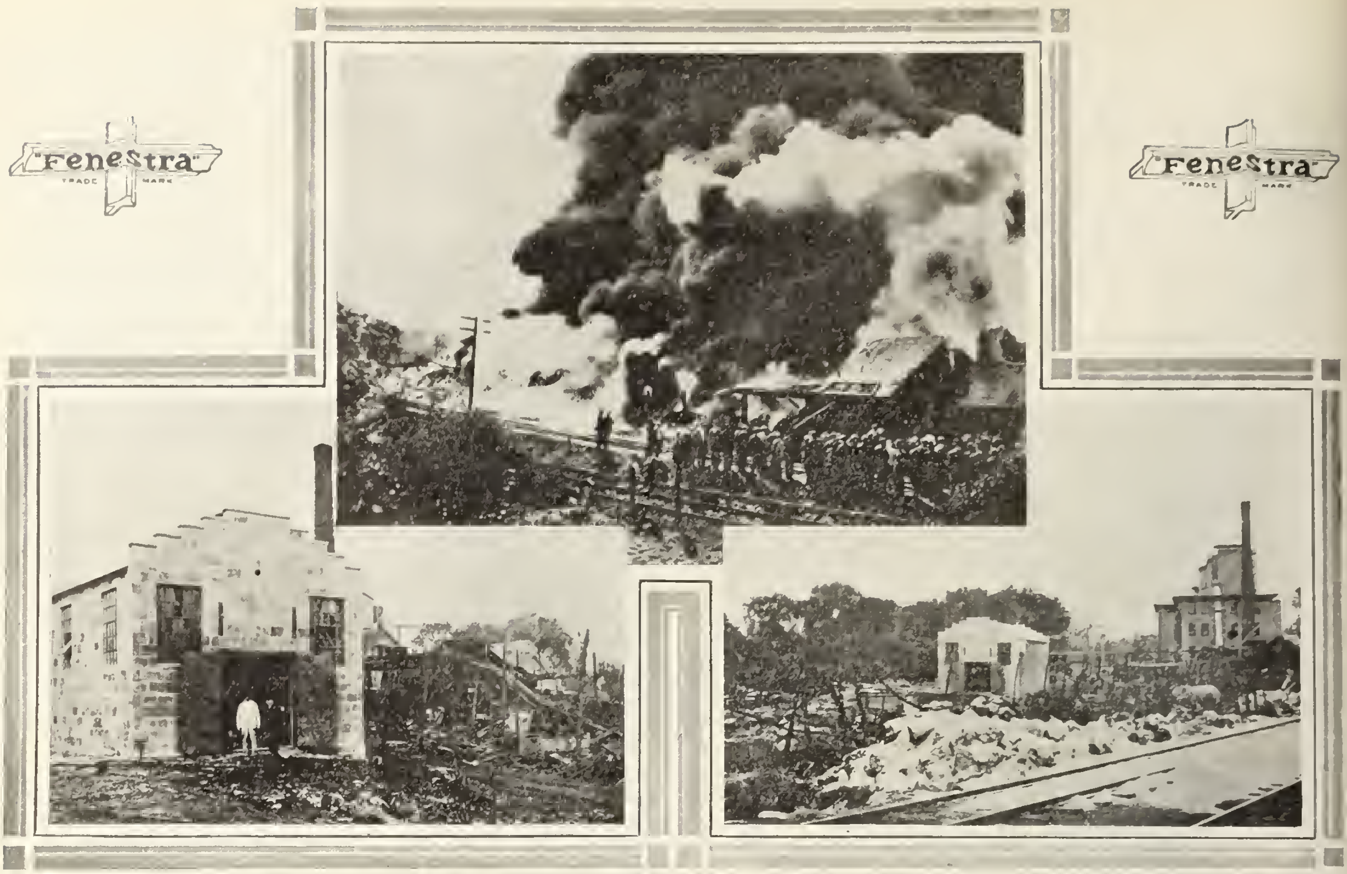

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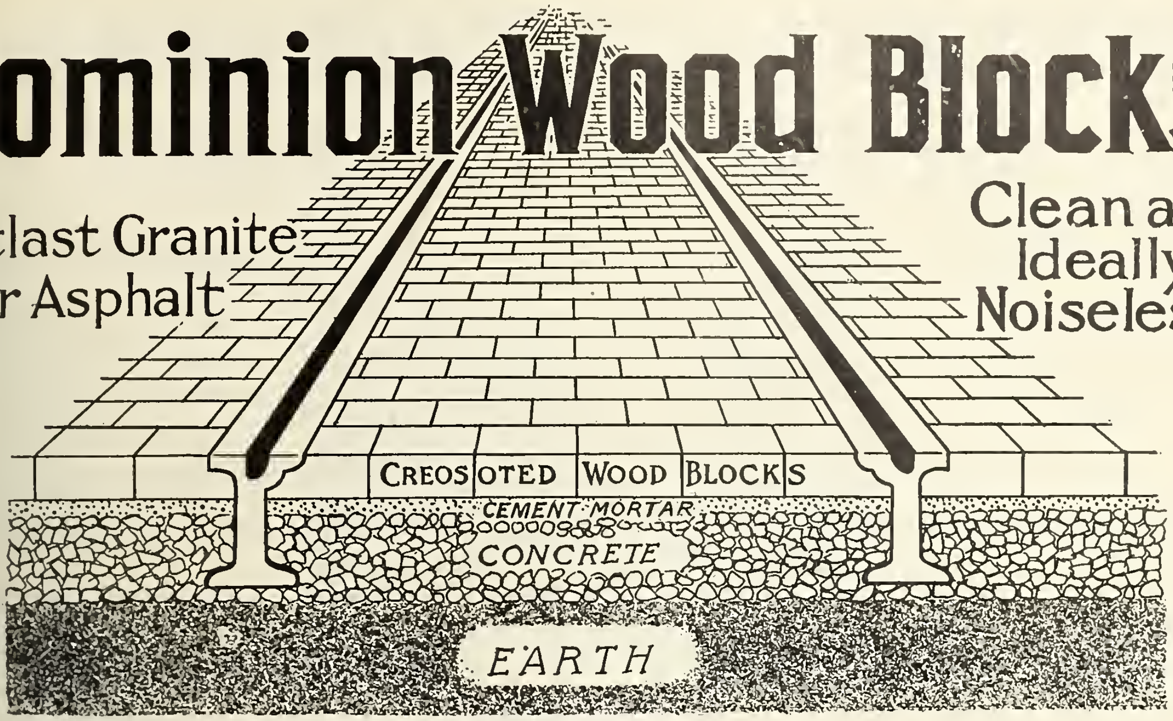

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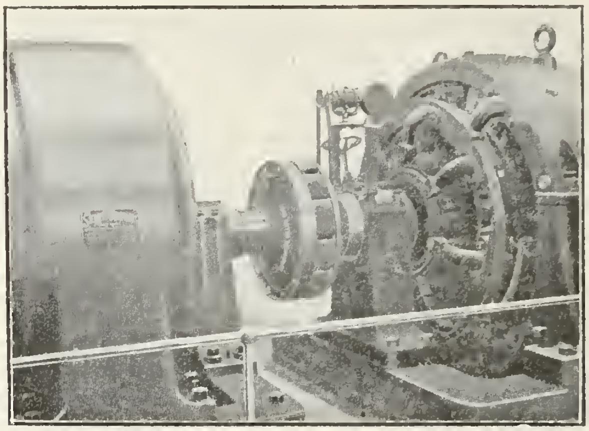

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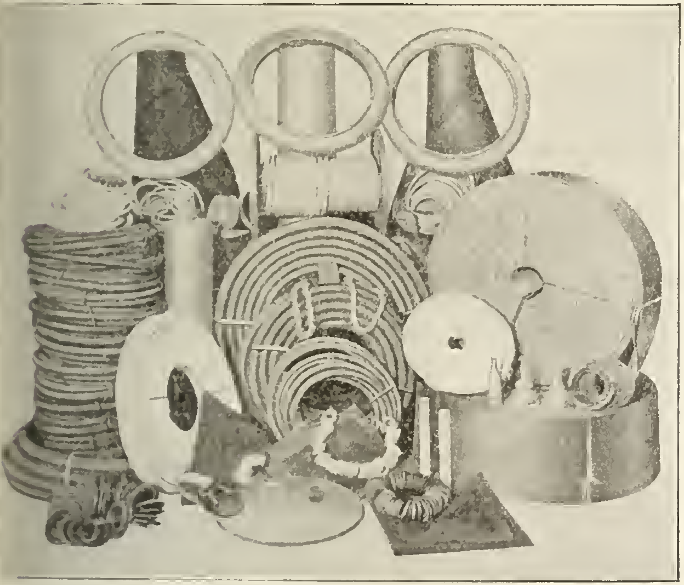

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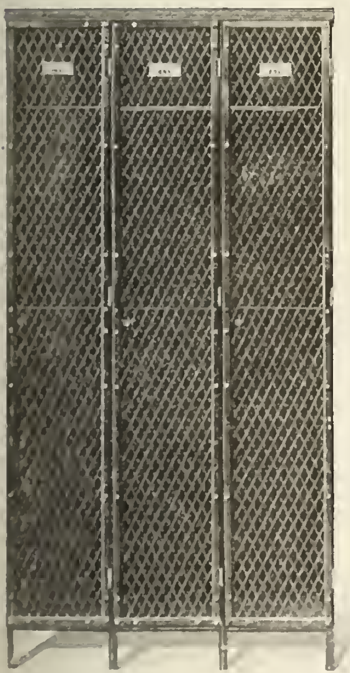

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Vol. 26 January 31, 1912 No. 5

The Government and Good Roads

It is of vital concern to the constructional interests of Canada, in common with every other community in the country, that the Canada Highways Improvement Bill, which was recently introduced into the House of Commons, should become law. The bill may be regarded as the part consummation of the pre-election pledges of the present Government. There was never a more opportune time for the inauguration of an active, progressive policy. A great deal of zealous missionary work has been carried out in recent years and the influence of such work upon the people is evidenced by their changed attitude. Men realize that the future of the country depends upon the facilities that it offers for rapid transportation. They see that the resources of the country are lying idle while there is no means of distributing them, and while the cost of getting in supplies to the scene of operations is prohibitive to development work. In short, they have learned the lesson that the country's first and most pressing need is "opening up."

Canada is a country of illimitable resources and untold possibilities, but it is also a land of great distances. These distances would not appear so formidable if the country were equipped with better highways. The agricultural districts in the fertile West would not seem so hopelessly isolated if better means of communication were provided. Public interest is strong and the time is opportune, and both the Provincial and Dominion authorities will find the people ready to support them in prosecuting this work. We all have large expectations of the new government in connection with good roads. We are all prepared to sanction liberal expenditure on the work.

Dominion Governments have been generous helpers in the work of railway building, and Provincial Governments have been by no means parsimonious in aid of the same class of enterprise. If they were to become as free givers in the work of making the King's highway what it ought to be, the expenditure would prove at least as fruitful of public good and of national progress as when applied to railways.

Every encouragement should be given to the governments concerned to spend without stint on the primary highways of traffic. The wave of progress thereby set up would sweep throughout the whole economic and social system of the country. Farms and farming would at once feel and strongly respond to the impulse. Country life would be very happily revolutionized. Production and traffic would be intensified and centres of manufacturing industry and of trade would rebound to the quickened and enriched circulation set up by the good roads.

In his speech from the Throne at the opening of Parliament last November, H.R.H. the Duke of Connaught touched upon the question of good roads and intimated that this would be one of the first subjects to receive special attention. In this connection it is interesting to learn from Mr. W. J. Kerr, of New Westminster, B.C., president of the Canadian Highway Association, that an outline of an improved road programme has been submitted to the Premier. Western Canada is doing everything in its power to promote the good roads cause. Among the most strenuous advocates is Mr. J. D. Taylor, member for the Westminster district in British Columbia, who in a recent speech at Langley said that he would devote his principal efforts to bringing about an improvement in the standard of Canadian highways. He also pointed out that at the time of Confederation the Dominion Government made a Canadian highway one of the inducements offered to British Columbia,—a promise which still remains unredeemed. Mr. Kerr told his hearers that the day of the "rock-strewn trail" was past, and that they were as much entitled to first-class roads as the city resident.

Sewage Purification

The permanence of sewage filters of the intermittent sand type is discussed by Messrs. H. W. Clark and S. DeM. Gage in the last report of the Massachusetts State Board of Health. They point out that while the purifying work of a filter is measured largely by analyses of the different combinations of nitrogen in the sewage applied and in the effluent, still the nitrogenous organic matter forms but a small part of the organic matter in sewage, and hence its change in the filter forms but a small part of the work of the filter, this being especially true of sand filters or other filters of fine material. With trickling filters of material too coarse to act as a strainer, a speedy oxidation of the nitrogenous organic matter is the main requirement. This is not true of sand filters in which carbonaceous matter in large amounts are retained. Sand filter 1 at the Lawrence Experiment Station has received during its twenty-three years' operation to December 1, 1910, 2,395,532 gallons of sewage. This sewage has contained about 30 lb. of organic matter in every 12,000 gallons, or a total weight of about 6,000 lb. of organic matter applied to this small filter, and of this about 3,400 lb. have been organic matter in suspension. Of this total organic matter, the filter has retained and stored only 3.5 per cent. of the applied nitrogen and about 13 per cent. of the total organic matter. In other words, the filter has successfully cared for, without retention, 96.5 per cent. of the applied nitrogen and 87 per cent. of the total amount of applied organic matter.

The Underlying Principles of Success in Engineering

A FEW days ago the Premier of Manitoba delivered before the Engineers' Society of the University of Manitoba an address which, in the ideals that it offers, reminds us of the inspiring observations made recently in Toronto by The Hon. Mr. Justice Riddell (reported Contract Record, p. 40, Dec. 20).

Premier Roblin regards thoroughness as the keynote of success. Mr. Justice Riddell lays particular emphasis upon a high code of ethics and—always—accuracy. Both of these men have made their mark; both have attained distinction—something which does not fall to the lot of the average engineer; both have an extended experience of men and affairs; consequently each is pre-eminently qualified to outline the principles underlying success. Conjoined, these two addresses may be said to constitute the whole of the law and the prophets.

We give below the text of Mr. Roblin's remarks:

> "You have in your possession assets greater and more powerful than the wealth of the Rothschilds or Rockefeller, namely, youth, a healthy body, and a strong mind. These assets are your capital on which to begin your life's work. Above all things do not squander them. While the time is opportune, while you have the benefit of youth, build your foundations broad and strong and permanent to carry the superstructure of success which it should be your ambition to erect in after life.
>
> "Without ambition nothing can be accomplished. There is more pleasure and satisfaction to be obtained in overcoming obstacles and in making crooked ways straight than in evading difficulties and following the smoother course. Adversity proves men. Have something to work for; some goal in view. And set your ideals high.
>
> "It is a misfortune for a young man when through college to secure a position at the top. I say, it is a misfortune. It is far better for him to begin at the bottom—at the foundation work, and as he moves forward in life to rear the superstructure, towering high over others. The final reward will be ten thousand times greater than would be obtained from an easier position without difficulties.
>
> "You have chosen for your life work that which you think the best profession. What is engineering? It has been defined as 'the science and art of utilizing the forces of nature.'
>
> "This is the age of specializing. This is a necessary consequence of great industrial growth and the ensuing competition.
>
> "Engineering is as old as history. We have records of magnificent engineering feats from the hanging walls of Babylon and the reclamation of the desert by the Pharaohs down to the present day.
>
> "A man may have graduated with honors but still be an absolute failure. The foundations necessary to a man are character and reputation. Have character as the keynote of your life's work.
>
> "The opportunities in the West are many. Electricity is one of the greatest adjuncts of civilization and its possibilities are illimitable, in which connection might be mentioned the great asset of water power which we have. There is a rich and fertile field before you. By your own industry and by the example of others there should be a future before you all in which you will rise to honorable positions in your profession."

Nickel steel for bridges of short as well as long span is being used in Germany. The first case was on the Harburg bridge over the Elbe in 1908, where only a few parts subjected to heavy strain were made of the metal. It was used for the main trusses of a single-track bridge of 103-ft. span on the Oberhausen-Dorsten Railroad in 1910. These trusses were 16 ft. deep. The stiffening trusses of a suspension bridge at Kiel, 387 feet long and 9 feet deep, were made of this metal. The double-track structure across the Rhine-Herne canal, near Oberhausen, has recently been constructed of nickel steel; it is 200 feet long and 25 feet deep. From 2 to 2½ per cent. of nickel is used.

Motor-driven section cars for track gangs have been found to be a strong factor in obtaining satisfactory labor on some parts of the Missouri Pacific System, according to Mr. John Heshion, roadmaster at Concordia, Kan. His experience on 136 miles of branch line has been that when hand-cars were in use, it was difficult to get labor of the class sought, but that upon equipping the cars with gasoline engines, at first by an improvised arrangement, it became very easy to get men, while the difficulty continued on sections using hand-cars. The result has been that a number of motor cars are now being supplied on the system. He believes that the men of the type desired to do the track work and of intelligence requisite to supply foremen are discouraged by the exactions of operating a hand-car before and after a day's work on the track, so that they lose their enthusiasm and drop out before they have been in the service long enough for promotion. He believes that the question of obtaining good men for foremen is becoming serious.

A 6 x 8-foot reinforced concrete slab, 4 in. thick, on the 20th street viaduct at Denver, Col., supported 20 tons of pig iron when 18 days old with deflection of 9/16 inch. Three longitudinal hair cracks were produced on the lower side. After removing the load a permanent deflection of 5/16 inch was noted. The slabs on this viaduct are supported on the 8-foot sides. The concrete was mixed in the proportions 1:2:4, with the gravel screened to reject stones above 1 in. Reinforcement consisted of ⅜ inch square bars, spaced 9 inches on centres transversely and 16 inches on centres longitudinally. The bars were wired together and held up from the forms about ½ inch by small pebbles. A top coat ¾ inch thick of 1:2 mortar was placed over the concrete within an hour after pouring. The slabs were kept moist for 48 hours. For about 12 hours canvas was placed over the finished blocks, and then about ¾ inch of sand was used to retard evaporation. The high values obtained corroborates the belief that concrete gets its strength faster in the more arid countries.

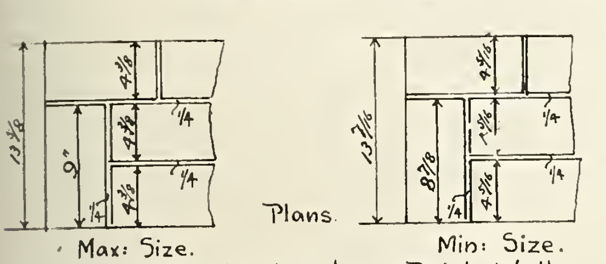
Proposed Standard Brick

Toronto, January 27, 1912.

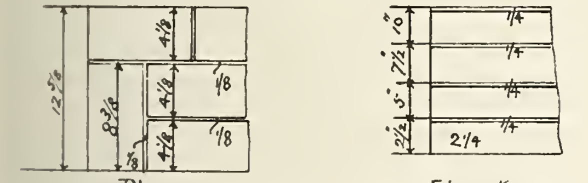
Editor Contract Record:

I note with interest that the majority of replies received in response to your request for expressions of opinion relative to the proposal to standardize brickwork are in favor of the change. A number of manufacturers would be willing to confer upon the matter and have the question settled as soon as possible. They say, with much point, that the longer this matter of standardization is delayed the more manufacturers there will be in the field and the greater the difficulty of getting all parties to agree. It may be taken for granted that all architects and engineers will only be too glad to specify standard brickwork and to know that when the bricks arrive on the job the different sorts will bond together and also that they will bond with the jointing of any stone or terra cotta that may be in the building. It would also mean more business for the manufacturers, for architects would often use glazed brick in lavatories and certain public buildings where now they decide in favor of tile, owing to the difficulty of bonding the two sorts of brick. Of course this matter of standardization will not enter into the field of the manufacturer of fancy brick.

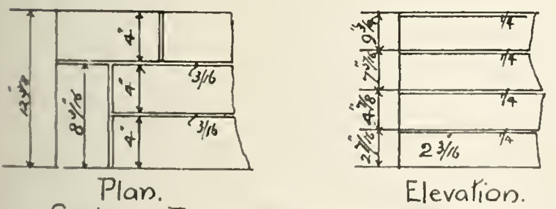
To show how divergent are the views of different manufacturers, I submit herewith sketches showing varying sizes of a one and a half brick wall. In the English standard an allowance is made for the shrinkage and warping of the brick by fixing a minimum and a maximum size. It is intended that a one and a half brick wall shall be 13½ in., a brick wall 9 in., and that four courses shall rise 12 inches, these dimensions being logically connected with the duodecimal system.



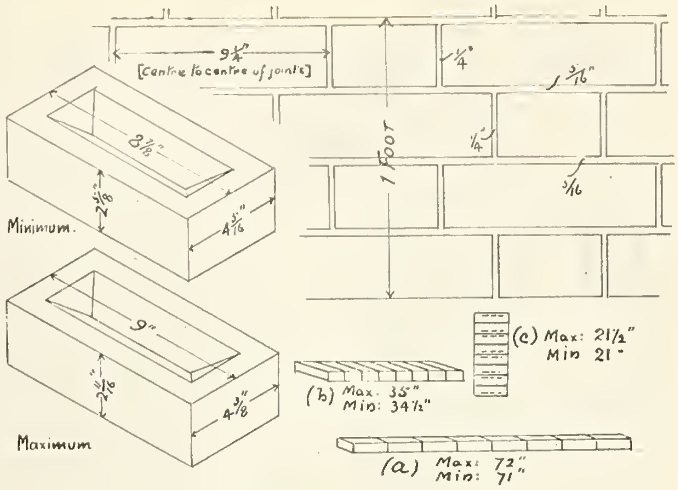
English Standard 1½ Brick Wall. Average 13½".



U.S.A National Brickmakers Association.



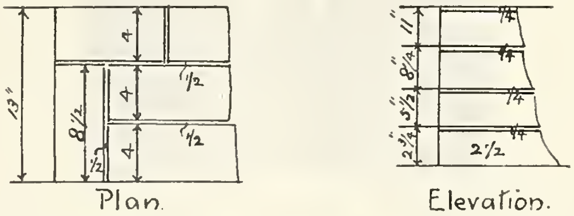
Sydney Pressed Brick Co· N.S.



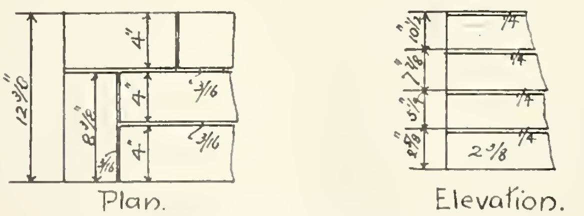
The Standard Brick.

Yours truly,
S. H. Penlington.

Concrete slab spans are used for all ordinary bridges up to 20 feet on the Nashville, Chattanooga & St. Louis Railway, according to Mr. A. F. Ganier, and a standard type and method of design have been adopted to simplify office and erection work in this connection. The floor is a simple flat slab with shoulders to retain the ballast, which is built at one side of the final location and skidded into position on plain concrete abutments. The principal reinforcement is old rails, mostly of 40 to 52 pound section, 12 to 15 being used, according to the span. Provision web stresses is made with expanded metal instead of stirrups or bent rods. A 3 x 8-inch mesh weighing .6 pound per square foot is used, passing under the rails and bent upward to the top of the beam in each of the spaces between pairs of rails, so as to form a continuous series of ridges or nearly vertical planes of mesh reinforcement.



Don Valley Brickworks, Toronto. Measured Sizes.



Milton Pressed Brick Co· Ontario. Measured Sizes. (Red)

Civil Engineers in Session at Montreal

Proceedings of the 26th Annual Convention of the Canadian Society of Civil Engineers — An Interesting Address from the President

MONTREAL was the Mecca of the engineering profession last week, the occasion being the 26th annual convention of the Canadian Society of Civil Engineers, which was held on January 24-26 at the Society's headquarters at 413 Dorchester street west. It was only to be expected that there would be a representative gathering of engineers from all parts of the Dominion, and the meeting was certainly not a disappointment on this score. If the sessions were not as prolific in technical discussions as former meetings and if the papers presented were conspicuous by their absence, there were occasions when the topics discussed were of vital interest to those present. Not the least important of these was the relation of the Society to the engineer in the matter of differences arising between the engineer and the municipality. This matter was the subject of a considerable amount of "private" discussion, but it is no breach of ethics to record the fact that the Society is opposed as a body to taking up the position as arbitrator in such cases. It is felt that such a line of action is outside the pale of the Society; that the main object of the Society is the advancement of engineering knowledge. In this connection the closing paragraph of the Report of Council is noteworthy:

Mr. W. F. Tye, the new President of the Canadian Society of Civil Engineers

> In view of recent discussions regarding the relations between members of the Society and corporations employing them and of the reported attitude of members towards one another in connection with such incidents, the Council desires to call attention to the Society's code of ethics and asks the co-operation of the membership in maintaining that dignity and decorum befitting a great profession.

The discussion to which we have referred followed upon the conventional opening by the president, Mr. C. H. Rust, on the first day of the session, January 24. The first business transacted was the presentation of the Report of Council. This came in for some criticism at the hands of Mr. J. A. Jamieson, of Montreal, who remarked that it was notable for what it did not contain. Mr. Jamieson conceded that the council had transacted a great deal of business during the past year but deplored the tendency of keeping the membership of the Society in ignorance of the details of their work. The objects of the Society, said Mr. Jamieson, were to facilitate the acquirement of professional knowledge and to encourage original investigations. He did not consider that these objects were being fulfilled. It would strengthen the profession if new life were infused into the Society and there were more activity in the preparation of papers and the conduct of discussions.

Among those present was Mr. T. K. Thompson, a director of the American Society of Civil Engineers. Mr. Thompson paid a brief tribute to the Canadian Society and testified to the esteem in which it was held in the United States. In regard to the presentation of papers he suggested that their own practice of reading extracts of papers was in his opinion worthy consideration. The value of the paper generally lay in the criticism that it evoked. The after-discussion brought out the points of real interest.

Mr. H. H. Vaughan, of Montreal, attributed the paucity of papers to the tremendous activity in the engineering field. Canadian engineers had too much to do to write papers and they got enough work without advertising themselves in this way.

The report of the Finance Committee and also those of the Library and House Committees were received and adopted. The financial status of the Society is well maintained, the statement for 1911 showing a balance of nearly $10,000. The present membership of the Society is 2,882, as compared with 2,739 last year, an increase of 143.

Proposed Government Tests

Considerable discussion followed upon the presentation of the Report of the Committee on the Establishment of Testing Laboratories. This report was read by the Chairman of the Committee, Mr. C. H. Keefer, who elaborated upon the work that had been accomplished during the past year. It was recommended that the Dominion Government should be requested to establish a laboratory for testing all classes of structural materials and that the Society should provide the authorities with a definite outline of requirements as to machines, appliances and men especially trained for such work. The discussion hinged chiefly on the necessity or otherwise of an especially large testing outfit. Dean Galbraith expressed the opinion that such was not altogether necessary. Scientific engineering, he said, had to do with the design of structures from a knowledge of the properties of smaller structures.

The Forth Bridge, one of the largest works of its kind in the world, was designed without any special testing appliances. In deciding upon the girders for this structure Sir Benjamin Baker, the designer, experimented with stove pipes. There were many who did not see the necessity for these large and expensive testing laboratories. The question was one that should be considered carefully by the Society.

The matter was finally left in the hands of the committee to co-operate with other bodies and to bring the matter before the Government.

On Wednesday, January 24, an informal luncheon was given at the Windsor Hotel by the members of the local branch. About 150 guests were present. At the conclusion of the luncheon a brief address of welcome was made by Mr. Henry Holgate, of Montreal. The president, Mr. C. H. Rust, responded briefly. At the close of the luncheon the members returned to headquarters and proceeded with the business meeting. This was continued until four o'clock, when Mr. C. H. Rust delivered his presidential report, which was received with much enthusiasm. The text of the report was as follows:

PRESIDENT'S ADDRESS

In concluding my term of office I again wish to thank the members for the honor which they conferred upon me a year ago, when they elected me President, and to express the great pleasure it affords me to congratulate the officers and members upon the continued growth and prosperity of the Society. The number of members of all classes, published in the Official List, in the autumn of 1887, immediately after the formation of the Society, was 365. The membership at the present time is 2,900.

The great advance in the prosperity of the country has resulted in an increased demand for engineers, which demand has necessarily been of financial benefit to the members of that profession.

The tremendous growth in the Dominion, more especially in the West, within the past few years, has rendered necessary the construction of two additional transcontinental railways; the increase in the production of wheat and other products in the Western Provinces has also resulted in a strong demand to the Government to increase the size of the Welland and St. Lawrence Canals. At the same time a large section of the country has so strongly impressed upon the government the necessity of constructing the Georgian Bay Canal, that surveys, plans, and estimates of the cost of the work have been prepared.

It is to be hoped that the government will also recognize the importance of making a thorough survey of the St. Lawrence route, with a view to an enlarged waterway.

In addition, the increased use of electricity, arising from the demand for cheap power, and the utilizing of the same by our municipalities, has necessarily involved the development of our great natural water resources, and this great development throughout the country has consequently increased the duties and responsibilities of our profession.

Municipal Engineering

As my entire professional career has been devoted to municipal engineering, I propose to confine my remarks to this subject.

Municipal engineering is now recognized as a distinct branch of the profession, and includes a great variety of subjects, in which the engineer, embarking in this field, is supposed to be well versed. It is also necessary for him to possess considerable tact in dealing with the various members of his council, and with the public.

A municipal engineer, from the very nature of his duties, must be somewhat of a sanitarian. At present considerable attention is being paid to the health of the people, with the satisfactory result of a decreasing death rate. People moving into cities naturally ask, where do you dispose of your sewage, and from where do you obtain your water supply?

The old method of disposing of sewage by depositing it into the nearest stream, without any regard to the fate of the town situated lower down, is now very properly being discontinued. Plans for the purification of water supplies, and disposal of sewage are being considered, and plants constructed by a number of our municipalities. These plans for sewage disposal and water supply have now to be approved by the boards of health of the different provinces. It is a regrettable fact that on very few of these boards of health there is any person qualified to advise upon engineering matters. In most of our provinces these boards are composed entirely of members of the medical profession, who have only a superficial knowledge of the engineering features of the plans submitted, and are consequently not competent properly to decide upon them.

There is now a bill before the Senate, which will be most drastic if it becomes law. The bill entirely prohibits the disposal of sewage into any body of fresh water. This will be a great hardship to many small municipalities who will be unable, for financial reasons, to put in a sewage disposal plant to comply with this act. From the wording of the bill it seems that they have entirely overlooked the fact that spring freshets yearly remove from the streets, roads, and farm yards large accumulations of filth, which eventually find their way into the rivers and lakes.

Mr. H. H. Vaughan, Montreal, who has been elected Vice-President of the Canadian Society of Civil Engineers

The question of the proper method of disposing of sewage is one of great difficulty, and no general scheme suitable to all towns can be approved. Each locality of necessity requires special study. Municipalities situated upon the Great Lakes may be allowed to discharge their sewage into the lake, after screening and sedimentation, provided the water supply is filtered and drawn from a point some distance from the sewage outfall. This method of disposal cannot, however, be premitted in the case of towns situated upon small streams, which are used for water supply. In such cases settling basins and filters will be required, and in the colder section of the country it will probably be found necessary to cover these filters.

The furnishing of an adequate and pure supply of potable water to the citizens should be the object of most careful study. Until recently it was not considered necessary to filter the water supplied to the majority of our Canadian municipalities. This problem is now, however, receiving general consideration. Toronto has just completed slow sand filters for the water supply, and is the first city situated on the Great Lakes to take this step.

Within the past few years the use of hypochlorite of lime for the purification of water has come prominently into use.

Recent Troubles at Toronto

The obtaining and storage of a constant supply of water from the Great Lakes, through a long line of submerged pipe, is a problem of considerable difficulty. A brief account of the accident to the Toronto conduit may be of interest as showing the troubles and anxieties that befall the municipal engineer. To be suddenly called up in the night, and find that four hundred thousand people are in danger of a water famine, is only one of his many anxieties.

Toronto is supplied with water from Lake Ontario through a six foot rivetted steel pipe, made in lengths of between 150 feet and 160 feet, and bolted together with cast steel flanges.

Early in February a very severe storm from the east occurred, which filled the lake, as far as the eye could reach, with large quantities of floating ice, while ice banks thirty or forty feet high also formed along the shore.

On the 7th of the same month difficulty was experienced in obtaining a sufficient supply of water, and, on examination of the shore crib, a great many branches of trees and other debris were discovered. During the night all the pumps were closed down, and then started up, with the expectation that this would remove the obstruction. This method, however, proved unsuccessful. Divers were then sent down into the pipe where a log, twelve inches in diameter and twelve feet long, was found, as well as other small pieces of timber and a large accumulation of sand. Steps were immediately taken to have this sand removed by pumping, using a centrifugal pump. The supply of water to the city was entirely stopped and had to be obtained directly from the Toronto Bay.

Upon a further examination of the pipe it was found that about 600 feet from the shore there was an opening of about four and a half inches in one of the joints, only ten bolts being left out of forty. Four other breaks were found in the pipe line, three pipes being entirely separated, all bolts removed and a great many of the rivets sheared off, making it necessary to have these pipes lifted and taken to the city for repairs. The four and a half inch opening, however, was repaired by putting in a tapered wooden gasket. Piles were then driven close together on each side of the pipe and the space filled in with concrete. The work of removing the sand from the pipe was one of considerable difficulty. We are now driving steel sheet piling on either side of the pipe for a distance of twelve hundred feet from the shore, leaving a space of about one foot between the pipe and the piling, and filling this space with concrete. The total cost of making these repairs will be nearly $100,000.

As a test of the efficiency of the hypochlorite of lime treatment for water purification, it may be pointed out that during the period of some weeks, when the city was using polluted water from the Toronto Bay, no considerable increase in typhoid occurred. Without this plant no doubt Toronto would have had a most appalling epidemic of typhoid.

Road Work

The designing and construction of roadways is a branch of municipal work that has not been so carefully considered as that of sewage and water supply. Macadam, especially in our large cities, is rapidly giving way to a more permanent and sanitary type of roadway. The ever increasing use of self-propelled vehicles demands a roadway which is dustless and capable of resisting the wear and tear of motor cars travelling at a speed from twenty to twenty-five miles an hour. At the present time roadway engineers are experimenting with various types of bituminous macadam surfaces to meet these conditions.

The alleviation of the dust nuisance in cities and towns, especially when the temperature is too low to permit of the use of water, should be more thoroughly studied. Medical men inform us that the clouds of dust which arise from the roads are germ-laden, and a source of danger to the health of the community. The use of vacuum-cleaners should be adopted as a more efficient method of cleaning the streets.

Transportation Problem

The transportation of people in large cities is a problem which has not yet been satisfactorily solved. Complaints are constantly being heard of the disgraceful congestion of the various street car services, particularly during the rush hours in the morning and evening. It is essential that traffic conditions in various streets, a subject that up to the present time has received very little consideration, should be carefully studied, in order to obtain a solution of the difficulty. There is also a growing tendency towards constructing, in the business centres, as far as possible, a noiseless pavement. The wooden block, properly treated, most nearly realizes this ideal. For heavy traffic in the neighborhood of docks, railway yards, etc., the granite block is the most satisfactory. For sidewalks, concrete has entirely taken the place of wood and makes an excellent walk at a reasonable cost. The only objection is that in winter, particularly upon slight grades, it is somewhat slippery.

A great deal of careful consideration will have to be given to the proper and most efficient method of collection and disposal of garbage, ashes, etc. Toronto has now this matter prominently before it, and has to decide whether a reduction plant, or the disposal of the refuse by incineration will be the most satisfactory.

The construction of street railway tracks in city streets is a work involving many difficulties. Experience in Toronto has shown that T-rails, weighing from seventy to eighty pounds, and grooved girder rails, weighing from ninety to one hundred pounds, are the most satisfactory. T-rails are used on residential streets and in the out-skirts, but the heavy grooved girder type of rail is used upon streets subjected to heavy traffic. The rails are laid upon steel ties, six feet centres, with suspended joints. Under the whole of the track allowance pavement for about a width of 18 feet, a concrete foundation 12 inches in depth is used. This is increased to 18 inches at intersections. The City of Toronto has been experimenting this year with wooden ties, having two feet centres, to ascertain if the vibration and noise caused by the use of the rigid type o construction necessarily involved by the steel ties could not be got rid of.

Following the almost universal practice in England within the past two or three years, municipalities have evidenced a strong tendency towards operating public utilities and, providing these services can be kept clear of politics there is no reason why they should not be administered a economically and satisfactorily as by a private corporation with the consequent result of decreased cost to the people.

The universal adoption of the telephone, and the grea increase in the use of electricity, etc., has multiplied the number of unsightly poles and wires which now disfigur our streets. In European cities such poles and wires ar very rarely seen, but up to the present time American muni cipalities have not taken very active steps towards disposin of these unsightly and dangerous nuisances. Montreal. believe, has taken some steps towards the construction o lines of conduits for the use of the various companies. It is to be hoped that within the next two or three years other cities also will take this matter up.

Great Expenditure on Engineering Work

The growth of the municipalities in the Dominion, as shown by the recent census, gives some indication of the large amount of money expended in constructing the facilities which are imperative in rapidly growing communities. With a view to presenting to the members an idea of the vast amount of money spent by the municipalities within the past ten years, I obtained, from twelve of the most important cities in Canada, a statement of the expenditure upon engineering matters only, amounting to the enormous sum of approximately one hundred million dollars. This does not include money expended upon the construction of street railway lines, and in some cases does not cover the amount spent in cleaning streets, and disposing of garbage, nor upon public buildings.

I also endeavored to obtain a record of the number of miles of roadways, sidewalks, sewers and water mains constructed during this period, but, unfortunately, some of the cities have no records extending back so far. I am, however, able to give you these statistics from Winnipeg, Montreal and Toronto.

City.	Miles of Pavements.	Miles of Sidewalks.	Miles of Sewers.	Miles of Water Mains.
Winnipeg	85	266	135	144
Montreal	37	120	114	40
Toronto.	251	410	70	114

In addition to the construction of these various improvements there have been other and more important works carried out, such as the building of electric plants, street railway lines, subways, bridges, abolition of grade crossings (part of the cost of which is generally borne by the municipalities), the construction of sewerage works, filtration plants, etc.

The spending of this stupendous sum of money distributed over such a large number of contracts should give the public some idea of the immensity of detail required in designing and carrying out the various works. Unfortunately, the average citizen does not seem to appreciate the length of time and the attention required to successfully carry out so vast an amount of work, and the municipal councils frequently insist upon having estimates and plans prepared in such a limited time that it is almost impossible to avoid mistakes, resulting in extra charges, etc.

Co-operation With the Engineer

It is to be regretted that in many of the municipalities the members of the council are not cognizant of, or do not sufficiently realize the importance of the work undertaken by their engineer. This, I think, is one of the reasons for the unfortunate criticism, fault-findings, etc., which so frequently occur. The engineer, as an advisor of the council, should receive more assistance than the head of any other department, because his department is the one which involves the greatest expenditure in the city service, and the one which naturally the citizens are apt to consider critically. During the past year I have heard of two or three cases in which the engineer considers he has been treated most unfairly by the municipality, and this tendency to censure unjustly an engineering officer seems to be increasing. This is a very difficult matter to deal with, but could perhaps be alleviated if the members of our profession asserted themselves more emphatically, and could induce the press to realize the difficulties that beset the engineer in carrying out the various works. Unfortunately it seems to have become the habit of some members of the press to make assertions derogatory to the engineers without first ascertaining whether they are based upon fact or otherwise.

A very large number of the members of the Society are brought into daily contact with laborers. This is especially the case on railway construction and other works remote from civilization, and, whilst it is not an engineering question, it has occurred to me that by some effort on the part of engineers the conditions of the men engaged upon these works could be materially improved. We all realize that the more perfect the sanitary conditions of these camps, the better the food, etc., the better is the quality and quantity of the work performed. The consideration of the labor problem should receive more attention than is usually accorded it.

The question of deciding upon the proper examination for admission to the Society of applicants who are not graduates of any recognized engineering school, is one which will have to be carefully considered by the incoming Council.

In concluding this address, I regret that, owing to my residence away from headquarters, I have not been able to give the attention to the affairs of the Society which I have wished, but through the untiring efforts of the members of the Council, and of our Secretary, the interests of the Society have been well looked after, and, upon retiring from the office of President, I wish to thank those gentlemen for the able manner in which they have assisted me during the year.

Announcement was made that the Gzowski Medal had been awarded to Mr. W. G. Chace for his paper on Hydro-Electric Development at Winnipeg, presented at the last annual meeting.

An Interesting Address by Dr. Barnes

On Wednesday evening the members of the Society were entertained to an interesting lecture entitled, "Iceberg Detection in Navigation," by Dr. H. T. Barnes. The address was given in the lecture hall of the Chemistry Building at McGill University.

Dr. Barnes stated, in introducing his subject, that his attention had been first directed to ice matters by Mr. John Kennedy, who was present in the hall. Ice, he said, was the corpse of water, which objected strenuously to the formation of the solid body and was continually striving to aid man to get rid of this undesirable and non-useful form. Mr. Kennedy, who believed in the relation between minute variations of temperature and the disintegration of ice formations, had asked what could be devised beyond the ordinary thermometer, which registered no perceptible change in the temperature below 32 or freezing point. As a result the lecturer, assisted by Mr. King, had succeeded in devising a thermometer from which readings of one-ten-thousandth of a degree could be as easily made as of one degree in an ordinary instrument, and this on a moving ship or train, under any conditions of vibration, and in any position. This he called the micro-thermometer, by the use of which it had been found that ice had an important effect upon the temperature of water, so that the distance of a boat from a field of ice or an iceberg could be determined by thermometric readings. It had also been found that the disintegration of ice was due to the presence of the sun's rays in the water itself, and the micro-thermometer was capable of indicating the effect of the sun upon the temperature of the water during so brief a period as one minute.

Acting on this information, the ice at the head of Lake St. Peter had been broken up, allowing the sun to act upon the water, with the result that the ice had gone out of the lake ten days earlier than out on the Richelieu river, although it was usually closed up for a longer period. Such a result showed the importance of getting the ice in the river away as early as possible, but Dr. Barnes was willing to go further and say that he did not see any necessity for having it there at all. It might be said that this was unpractical, but it could only be demonstrated by proper experiment. The trouble with the Government experiments at Cape Rouge was that they were only conducted in a half-hearted manner.

The Lady Grey and the Montcalm, although wonderful in their behaviour, were not ice-breakers, but only inspection boats, capable of working through a certain thickness of ice, and what the Government needed was some real ice-fighting machines such as those used in the ports of Norway and Russia. When the Hudson Bay route should be established he predicted that use would be found for half a dozen of these, and, although he did not wish to enter into a discussion upon the subject, he could state from the experience of Mr. King, who had made the journey, that it was just as feasible to navigate the Gulf of St. Lawrence in winter time as the Hudson's Bay in the summer.

Mr. C. N. Monsarrat, Ottawa, a member of the council

The lecturer's remarks were illustrated by a number of excellent views, and also by a very illuminating experiment with some water and ice.

At the conclusion of the address the visitors adjourned to the Engineering Building, where a reception was held by the President and members of the Council. Following this came an inspection of the laboratories and workshops of the University.

Excursions to Engineering Works

On Thursday, January 25, organized excursions were made to the Angus shops of the C. P. R. and to the works of the Dominion Bridge Co. and the Canadian Car & Foundry Co. The first of these was in charge of Mr. H. H. Vaughan, who, as is well known, is assistant to the vice-president of the C. P. R. The company provided a special train for the party, which left the Windsor Station shortly after ten o'clock. A dining car was attached to the train and luncheon was served after the inspection of the shops. The second party was in charge of Mr. P. Johnson and G. H. Duggan. Special cars for this party were provided by the Montreal Street Car Company, and a start was made from the Windsor Hotel at about ten-thirty. The works of the Dominion Bridge Company were inspected carefully throughout and called forth great interest from the members. The draughting office, where 125 detailers are employed, came in for special attention, and it was conceded by many of those present that the rooms were among the best appointed of the kind they had ever seen. The party was shown over the works from the point where the steel is received over the canal, through the storage yards and pattern shops, the large metal shop where the cutting and punching is performed, to the assembly shed and auxiliary shops. An opportunity was afforded of examining portions of the steel intended for the Lachine Bridge and various noteworthy building works in Toronto and other cities. After an excellent luncheon provided by the Dominion Bridge Company, this party left for the Canadian Car Company. Here also the members were afforded the opportunity of inspecting in detail one of the most up-to-date plants of its kind in the country. The various departments included the bolster shop, the main car shops, truck shop and machine shop. At Turcot the company have a plant which is devoted almost exclusively to the manufacture of steel underframes.

Annual Banquet

The annual banquet of the Society was held at the Windsor Hotel on the evening of January 25, and was attended by some 150 members and those identified with the profession.

After a very enjoyable menu the usual loyal toast was proposed. The President-Elect, Mr. W. F. Tye, proposed "Our Country," which was responded to by Mr. G. W. Stephens, president of the Montreal Harbor Board. Major Stephens dwelt especially with the great natural resources of Canada and urged that they should not be dissipated. He contended that no country had ever become great without a careful conservation policy.

"One of our greatest assets," said Major Stephens, "is the St. Lawrence route, which reaches from the heart of the continent to the sea. In connection with that I wish to say that before everything else the St. Lawrence should be consecrated to the interests of navigation. Nothing should be permitted to be done to that river between the Great Lakes and the sea which could destroy its integrity as an avenue of commerce leading from the ocean to the heart of this continent."

Major Stephens said that the engineering profession were peculiarly qualified to appreciate this great natural resource. The ordinary layman could not realize what the St. Lawrence meant to the country He quoted comparisons to show what such a waterway would mean in Europe, South Africa, and the United States. In the latter country it would reach from the port of New York to Salt Lake City.

"But," said Major Stephens, "we have not the faintest idea of giving it to any but the Canadian people. That river is our property and inheritance, and it will be developed, with the aid, the prestige, and the energy of Canadian civil engineers."

"As a Canadian," he continued, "I hope that this great natural avenue of commerce will be preserved to this country as a highway of trade. There are possibilities in the development of water power that can in no way interfere with navigation, which will make us powerful in our manufactories, powerful in our relations to other countries and powerful as a nation, and I trust that the members of the Canadian Society of Civil Engineers will see to it that this river is dedicated to the greatness of the Dominion, and that all our other great natural resources will be treated with the same wisdom and discretion, and that every Canadian will be brought to the same realization from the Atlantic to the Pacific. That done, the destiny of Canada will be one of which every citizen of the Dominion may well be proud."

One of the most interesting speakers was Major R. W. Leonard, the new chairman of the Transcontinental Railway Commission, who spoke of the vastness of the tereritory in Canada open for development, and of its richness in mineral wealth. He stated that he had recently been through a portion of the famous "clay belt" and that he had been astonished at what he had seen. "We have there," he said, "a stretch of about 400 miles, all of which is as good as the best prairie land in the Northwest, with a climate about the same as that of Manitoba, while it is also covered with spruce. That will give some idea of the size and possibilities of our country. While the width of Canada north of Lake Superior is at present just four feet eight and a half inches—or the width of the C. P. R. tracks—when the new Transcontinental line is finished the real width of the country there will be 450 miles, including much good country for agriculture, and that will tend in large measure to reduce the present enormous bridge between eastern and western Canada."

Mr. D. MacPherson, Ottawa, a member of the council

"Our Guests" was proposed by Dean Galbraith, of Toronto University, and replied to by His Worship Mayor Guerin, Mr. A. S. Goodchild (president of the Canadian Railway Club), and Mr. J. S. Brierley, of the "Montreal Herald."

Mayor Guerin, in responding to the toast, urged every branch of the profession to strive for perfection. "To your profession," he said, "is due, in a great measure, the progress we enjoy in this country." The Mayor referred to the work and ability of Mr. John Kennedy, the consulting engineer of the Harbor Commission, as a prompter to greater endeavors, and paid a high tribute to his achievements. His Worship spoke enthusiastically of the future of Montreal and claimed that this city of all others had the greatest future.

"Kindred Societies" was proposed by Mr. Henry Holgate, and responded to by Dean Adams, of McGill University, for the Canadian Mining Institute, who put in a strong plea for conservation of forest resources.

"The Society" was proposed by Mr. George A. Mountain, chief consulting engineer of the Railway Commission, and responded to by Mr. John Kennedy.

"The President and Council" was proposed by Mr. F. P. Gutelius, of the Canadian Pacific, and responded to by the retiring president, Mr. C. H. Rust.

The many excellent addresses were interspersed by song and recitations.

Friday's Session

The third day's proceedings were devoted to the consideration of reports and the reports of the scrutineers.

A long discussion followed the presentation of the report of the committee on roadbed and ballasting. Mr. W. B. MacKenzie stated that it would be of great benefit and convenience to all engineers engaged in railway work if a standard specification were adopted by the Society. There were many different specifications in use, and the draft submitted by the committee had been modelled largely on the standard of the American Engineers' Association, with certain supposed improvements. Mr. Mackenzie then made comparisons between the draft and the American Engineers' specification, and mentioned alterations which, in his opinion, should be made in the draft, particularly in relation to charges to be borne by the contractor.

The chairman suggested that Mr. MacKenzie should not discuss the specification in detail, but move that the report be referred back.

Mr. Mountain was of opinion that nearly all Canadian engineers would prefer to use a specification drawn up by the Society.

Mr. MacKenzie said that his suggestion was that before the specification was adopted it should be sent out to every member of the Society for criticism. It would be helpful if it were also sent to a number of railway contractors, some of whom had very decided views on standard specifications. He was of opinion that the contractors should have some say on this question, as it was unfair that the engineers alone should decide on the specification under which they both worked. Many of the contractors were engineers and could give valuable pointers.

Several members then discussed the procedure of considering and presenting reports, and finally Mr. Jamieson moved that the report be referred back for revision, with the suggestion that they should send their revised report to the members, and also to prominent contractors for railway work, for their suggestions, replies to be made within four weeks of the date on which they received the revised report. Mr. MacKenzie seconded.

Mr. Duggan moved, as an amendment, that notices be sent out requesting the committees of the branches to discuss the report and submit the discussions to the Society not later than the first day of March; also that those who could not attend the meetings be requested to send in a written discussion before the above date; that the committee be requested to take such discussion into consideration and ask for a letter ballot of a final draft of the report not later than 1st June, such ballot to be returned not later than 1st July. The amendment was carried.

After a slight discussion it was decided to sell the Society's house at Montreal to the C. N. R. for $60,000. The President stated that the Council had two or three other sites under consideration and that a new building would cost more than $60,000. It was agreed to leave the matter of a fresh site and building in the hands of the Council, the cost not to exceed $100,000.

It was decided that all other reports should be dealt with in the same manner as the report on roadbed and ballasting.

W. J. Kennedy brought up the question of Senator Belcourt's bill dealing with the disposal of sewage in fresh waters, and asked that the Council take some action. There was danger that the Bill might pass and as it was a very drastic measure some action on the part of the Society was desirable. Following a discussion a committee composed of Messrs. Kennedy, Tye, and Lea was appointed to approach the Senate on the subject.

A letter from Mr. Forrester on the subject of steel pipes and their durability was referred to the Council. Mr. R. W. MacIntyre, of Victoria, wrote on the question of the admission of associate members. There was, he said, a great deal of dissatisfaction in the West as to the admission as associate members of surveyors who had no engineering knowledge. Was the Society, he asked, to be a hybrid one or purely engineering? The letter will be considered by the Council. A communication on the subject of Federal Government survey of water sources was referred to the conservation committee.

Mr. MacKenzie brought up the question of the disintegration of concrete in salt water and suggested its consideration by a committee.

Mr. Jamieson replied that the cement specifications committee had been considering the subject for some time, and had collected a large amount of data. In Germany, the United States, and Scandinavia, extensive tests were being made. The committee had the results before them and hoped to be able to report next year.

The report of the scrutineers was given. The following were the results of the voting: President, Mr. W. F. Tye (by acclamation); vice-president, Mr. H. H. Vaughan (by a majority of 157 over Mr. L. A. Vallee). Members of Council:—District 1—Messrs. G. H. Duggan and C. N. Monsarrat; No. 2, Mr. W. B. MacKenzie; No. 3, Mr. A. Doucet; No. 4, Mr. D. MacPherson; No. 5, Mr. C. L. Fellowes; No. 6, Mr. J. A. Hesketh; No. 7, Mr. C. E. Cartwright. The following members compose the nominating committee: District 1—Mr. R. S. Lea; 2, Mr. J. L. Allen; Quebec, Mr. E. A. Hoare; Ottawa, Mr. James White; Toronto, Mr. T. C. Irving, Jun.; Manitoba, Mr. Frank Lea; Vancouver, Mr. J. C. Kennedy.

After his election Mr. Tye took the chair and briefly returned thanks. Various votes of thanks concluded the convention.

To keep a T-square from slipping, place two rubber bands on the blade of the T-square, one near the head and one at the other end, and it will remain in place when the board is at any ordinary angle. The wider the bands the better.

The Strength and Care of Chains

Chains seem to form a rather negligible quantity in contractors' equipment, judging from the amount of care that is given it. Many contractors are of the opinion that because a chain is a chain anything may be expected of it in strength, and if one fails by breaking it is condemned as bad. The same seems to hold good of the care that is given chains. As an example of this many contractors have had personal experience where an immense strain was put on steam shovel chains, where the entire shovel was raised on account of neglect in anchoring it. Again chains are often subjected to unusual abrasion by being permitted to drag or are placed on drums and sheaves at sharp angles, or are played out and taken in too rapidly.

TABLE OF PITCH, BREAKING, PROOF AND WORKING STRAINS.

Size of Chain.	Dist. from cen. of one link to cen. of next	Weight per foot in lbs Approximately.	Outside Width	BEST SPECIAL DREDGE.			B. B. B CRANE		
				Proof Test Lbs.	Average Breaking Strain Lbs.	Ordinary safe load General Use Lbs.	Proof Test Lbs	Average Breaking Strain Lbs	Ordinary safe load General Use Lbs.
1/4	25/32	3/4	13/16	2500	5000	1665	2000	4000	1335
5/16	27/32	1	1 1/8	3500	7000	2340	3000	6000	2000
3/8	31/32	1 1/2	1 5/16	5000	10,000	3335	4500	9500	3000
7/16	1 5/32	2	1 1/2	7000	14,000	4670	6500	13,000	4335
1/2	1 11/32	2 1/2	1 13/16	9000	18,000	6000	8000	17,000	5335
9/16	1 15/32	3 1/8	2	11,000	22,000	7335	10,000	20,000	6665
5/8	1 23/32	4 1/3	2 3/16	14,000	27,000	9333	12,000	26,000	8000
11/16	1 13/16	5 1/3	2 1/4	17,000	32,500	11,335	14,500	30,000	9665
3/4	1 15/16	6 1/6	2 9/16	20,000	40,000	13,333	17,500	36,000	11,665
13/16	2 1/16	7	2 3/4	23,000	42,000	15,335	19,000	40,000	12,665
7/8	2 3/16	8	2 13/16	26,000	48,000	17,333	22,000	44,000	14,666
15/16	2 7/16	9 1/3	3 3/16	29,000	54,000	19,335	25,000	50,000	16,666
1	2 1/2	10 1/2	3 3/8	32,000	61,000	21,333	28,000	57,000	18,666
1 1/16	2 5/8	12	3 9/16	35,000	69,000	23,335	32,000	65,000	21,335
1 1/8	2 3/4	13 1/8	3 13/16	40,000	78,000	26,665	36,000	72,000	24,000
1 3/16	3 1/16	14 2/3	4	46,000	88,000	30,666	40,000	80,000	26,666
1 1/4	3 1/8	16 2/3	4 3/16	51,000	95,000	34,000	44,000	88,000	29,333
1 5/16	3 3/8	17 1/2	4 3/8	54,000	104,000	36,000	48,000	96,000	32,000
1 3/8	3 9/16	19 2/3	4 9/16	58,000	114,000	38,665	53,000	104,000	35,335
1 7/16	3 11/16	21 1/8	4 3/4	62,000	122,000	41,335	58,000	116,000	38,665
1 1/2	3 7/8	23	5 1/4	67,000	134,000	44,665	62,000	124,000	41,335
1 9/16	4	25 1/8	5 5/16	70,500	142,000	47,000	66,000	132,000	44,000
1 5/8	4 1/4	28	5 1/2	77,000	154,000	51,335	72,000	144,000	48,000
1 11/16	4 1/2	30	5 11/16	79,000	158,000	52,666			
1 3/4	4 3/4	32	5 7/8	83,000	166,000	55,333			
1 13/16	5	33	6 1/16	89,000	178,000	59,335			
1 7/8	5 1/4	35	6 3/8	95,000	190,000	63,333			
1 15/16	5 1/2	38	6 9/16	101,000	202,000	67,333			
2	5 3/4	40	6 3/4	108,000	216,000	72,000			
2 1/16	6	43	6 15/16	115,000	230,000	76,666			
2 1/8	6 1/4	47	7 1/8	122,000	244,000	81,333			
2 3/16	6 1/2	50	7 5/16	129,000	258,000	86,000			
2 1/4	6 3/4	53	7 5/8	136,500	273,000	91,000			
2 3/8	6 7/8	58 1/2	8	152,000	304,000	101,333			
2 1/2	7	65	8 3/8	168,500	337,000	112,333			
2 5/8	7 1/8	70	8 3/4	181,000	362,000	120,666			
2 3/4	7 1/4	73	9 1/8	193,500	387,000	129,000			
2 7/8	7 1/2	76	9 1/2	206,000	412,000	137,333			
3	7 3/4	86	9 2/3	218,000	436,000	145,333			

The strength of a chain is the most essential matter connected with it and the best is none too good. For this reason great care and watchfulness must be bestowed in the endeavor to obtain good material, good welds and what is so essential properly formed links, and few buyers understand what cost is entailed. The iron of which best chains are made should have a tensile strength of about 52,000 pounds per square inch, an elongation in 8 inches of 25 per cent., and a contraction of area of 40 per cent. When manufactured into short link crane chain it should theoretically stand double this, because two parts are acting, or if one side only is considered, it is acting with a leverage of 2 to 1. There is, however, usually a loss of strength averaging 1/3 per cent., principally due to the impossibility of making the welds as strong as the solid metal.

The distance from the center of one link to the center of the next, which is the pitch of the chain, is equal to the inside length of the link; the dimensions given in the table are for guidance in making wheels for chains to run on and in them the pitch conforms with the outside dimensions given in the other table, an allowance of from 1/32 to ¼ of an inch, according to the size of the chain, being made for the weld. Should other dimensions of links be desired particular care should be taken to make this allowance and in all cases the inside length and outside width should be given. After the wheel is made, either it, or a section of it, should be given to the manufacturer, since to insure exactness, the chain should be fitted to the wheel while being made, for the slightest variation in the links will cause the chain to ride upon the cups, injuring and materially weakening the iron. By observation, chains used in cupped gearing lengthen in a short time about 1/16 between each pair of surfaces in contact. This is due to the wearing down to a fuller bearing, for when new, the bearings of the two rounded surfaces are not much more than points. The strains given are all for a single length of chain, and when more parts than one are used, the number must be considered, and in this connection the following rules may prove useful:

To find the weight a chain will lift when rove as a tackle.—Multiply the ordinary safe load general use in the table by the number of parts at the movable block and subtract one-quarter for resistance.

To find the size of chain necessary to lift a given weight.—Divide the weight by number of parts at the movable block and add 1/3 for friction, then find from the column of ordinary safe load general use, the corresponding strain and the size of the chain. In case of heavy chain or where the chain is unusually long, the weight thereof should be taken into account.

To find the outside length of any number of links.—Multiply the inside length of one link by the number of links and add two thicknesses of the iron.

The formula (diameter in ⅛th)^2 will give the weight per fathom of close link chain, approximately.

The diameter of sheaves or drums should not be less than 30 times the diameter of chain iron used.

Hooks and rings should be made from the best hammered iron and will appear clumsy and out of proportion to the size of chain, when made to equal its strength, for instance, a hook for ¾-inch chain should be made from 1¾-inch iron and the ring, if less than six inches diameter, should be made from double the size of iron in the chain, and if greater in diameter, the size of iron must exceed this proportion.

It is recommended in the construction of hooks, where it is possible, that the shank be made long in order to avoid acute angles, and to facilitate the handling of the hook without risk of injury to the hands of workmen.

Chains for hoisting purposes should be made of short links in order to wrap snugly around drums without risk of bending, and have oval sides so that when the chain surges, each link will act as a spring, yielding a trifle.

The life of a chain can be greatly increased by frequent annealing and lubricating, and when the wearing is not uniform throughout the length the chain should be cut and pieced where partially worn, so that when finally discarded every link shall have done its full share of work, without overstepping the limit of perfect safety.

Hoisting and sling chains should be annealed once a year at least, and carefully examined before being taken into use again. The chain of hydraulic machinery should be oiled with a brush, once a week or oftener if the machines are worked much, and to effect this they should be slacked in order to get the oil well between the links.

Care should be taken that no deposits of silt or grit remain in the links, as they cause quick wear.

To summarize the point of economy in the maintenance of chains we would repeat that the testing should be moderate, the general working strain never exceeded, the annealing frequent and lubrication thorough.

The above article was furnished to The Contractor, Chicago, by Mr. A. Crockett, of the Standard Chain Company, of Pittsburg.

Difficult tunnelling was encountered in tunnel No. 3 of the Little Lake Division of the Los Angeles aqueduct, according to the annual report of Chief Engineer William Mulholland for the year ending June 30, 1911. The trouble was caused chiefly by the presence of large quantities of carbon dioxide gas, which was so strong and persistent that rats were suffocated in the tunnel 3,500 feet from the point of issue of the gas. Even with the use of two large blowers, the report states, it was impossible to obtain sufficient ventilation, so it was decided to try to shut out the gas by lining. Concrete lining was put in for a distance of 150 feet on either side of the gas-producing area, as well as in the immediate vicinity, but this failed to confine the gas, which forced itself out between the concrete and the rough, rocky sides of the tunnel. Finally a trench was excavated completely around and outside the lining in the rock; a large suction blower was inserted in this trench, to draw the gas out, while another blower forced fresh air into the heading.

In connection with the opening up for navigation purposes of that branch of the River Nile at Cairo known as the Bahr-el-Aama, and the proposed re-alignment of the navigable channel of the river, tenders for the construction of an entirely new bridge to replace the existing Pont des Anglais were invited by the Egyptian Public Works Department from all the leading bridge engineering firms of Great Britain, Continental Europe and North America. Out of six tenders submitted that of the Cleveland Bridge and Engineering Company, Limited, of Darlington, has been accepted. The firm undertakes to complete the bridge in twenty-two months, the price being £60,000. The bridge is required to accommodate road and tramway traffic and there will be footpaths carried upon cantilevers on either side, the width of the bridge between parapets being 19 metres. In addition to two approach spans there will be a rolling lift span giving a clear opening for river traffic of 63 metres. The bridge is of artistic design and will be finished in ashlar, drawn from quarries near Cairo.

Approved Methods of Winter Concreting

Precautions which, properly carried out, Ensure Satisfactory Work in freezing weather and Prevent Unnecessary Delays

By Jerome Cochran, Designing Engineer, Trussed Concrete Steel Company, Detroit, Mich

To prohibit concreting when the temperature is near or below freezing, as is frequently done in specifications, causes unnecessary delays and imposes an unjust hardship upon the contractor. If concrete work is properly handled it may be successfully carried on irrespective of weather conditions. The cold weather clause in specifications, instead of prohibiting should be so written as to permit of construction during freezing weather, provided proper precautions, such as specified below, are taken. By providing proper enclosure to the forms, and maintaining a normal temperature by the use of salamander fires, supplemented by the use of concreting materials free from frost, and preferably heated so as to insure normal hardening, there is no reason why concrete construction cannot be continued throughout the cold weather with certain success and at a very small additional cost. It is simply a case of the use of satisfactory materials, placed with good judgment and subjected to careful and experienced inspection before the forms are removed.

General Requirements

When it is necessary to make concrete in freezing weather only Portland cement should be used and the materials should be heated by steam or otherwise, and hot water used in the mixing. The simple precaution of waking up the cement by the use of warm water in the mix causes it to deport itself more nearly as it does in the summer season.

Natural cements should not be used in freezing weather, as they will not stand freezing. In fact, most natural elements are seriously injured by frost, especially by alternate freezing and thawing.

Placing of concrete should be carried on continuously to insure a perfect monolithic mass. The greatest care should be exercised in using reinforced concrete during winter months.

No concrete should be laid in freezing weather unless proper precautions are taken to prevent injury to the concrete. Thoroughly effective means should be taken in every case to prevent the wet mixture from chilling or freezing and the contractor should make such special preparations as may be required to secure as good work as is done at other times. The mixer should be housed.

The proper precautions necessary to insure satisfactory results with concrete during cold weather depend very much upon the class of construction, large plain mass work such as retaining walls and abutments not requiring the same care and protection as thin walls, columns, beams and floor slabs.

It is customary to specify that no concrete shall be mixed, nor placed, nor any other operations performed during the winter season, unless permission is obtained from the engineer in charge of the work. If, however, the engineer is of the opinion that any operation can be satisfactorily performed during this season, he generally gives the contractor a special written permit, defining the work and the conditions under which such work may be done.

Careful inspection of winter work should be done before removing the forms, owing to the close resemblance between frozen and thoroughly hardened concrete in appearance. Frozen concrete frequently shows a fracture through the aggregate. Sometimes two weeks or more after placing, it is possible to drive a nail into the concrete which indicates how seriously the setting of cement is delayed.

In the winter time, the area of concrete work should be cut down by the use of bulkheads, so as to decrease the time of exposure of a single layer, which will result in running the work up to a greater height for a day's work.

On thin walls, the time of concreting should be limited to a 28 deg. F. on a rising thermometer and 32 deg. F. on a falling thermometer.

Too Much Water Will Cause Disintegration

In general, less water should be used for mixing in cold than in warm weather, and in no case should a surplus of water be allowed to accumulate and freeze on top of a layer of concrete and then be covered up with more concrete before thawing out. If too much water is used in the concrete, the expansion of the water in freezing may disintegrate the concrete by the mechanical action of the ice in forming.

Whenever any cement work freezes before it has become thoroughly set the entire mass should be removed. A slight frost extending only ¼ inch into the concrete is not detrimental to strength. Some contractors even claim that concrete can be frozen, thawed out, and will then reset. This may be so in some cases, but it is always best to remove any concrete in which the freezing has extended throughout the mass. Portions of surface concrete which have frozen should invariably be removed before laying fresh concrete upon them. No sudden removal of frost and ice on the surface by using hot water or steam should be permitted, but should be removed by use of cold water.

Particular care should be used by the superintendent in charge, to see that the forms are properly braced, the bottom of the beam and column boxes are clean before pouring concrete, that the steel is accurately placed, concrete thoroughly mixed, and the workmanship in general the best possible. Special vigilance is required of the superintendent during freezing weather.

The engineer may, however, when he deems it best, stop all concreting when the weather is at or below the freezing point. The engineer should prohibit the laying of concrete when the proper precautions are not being taken.

Heating Materials

Special precautions should be taken to avoid the use of materials containing frost or covered with ice crystals during cold weather.

Where it is possible to obtain sand and broken stone or gravel that is dry and free from frost these materials will not be required to be heated, but if not, the gravel or stone, sand and water must be heated. Artificial heat to prevent concrete from freezing should be subject to the approval of the engineer. The contractor should be required to provide ample steaming capacity. One dollar expended in heating the sand and gravel or broken stone with steam before mixing is worth ten dollars spent in heating cold concrete with salamanders.

If reinforcing steel is used, the steel should also be heated to the same degree as the concrete, or a steam hose and jet used to take all frost out of the steel bars before pouring the concrete.

The concrete should be placed in the work at a temperature of at least 60 deg. F., regardless of the temperature of the surrounding atmosphere.

The amount of heat required depends upon the temperature of the air and the rapidity with which the work can be done after heating stops. The water should be warmed, but not boiled, the sand and other aggregates should be heated, but not enough to blister the skin of the hand. Some specifications require that all sand, broken stone, gravel and water used in mixing the concrete in freezing weather, shall be heated to a temperature of not less than 150 deg. F., and the concrete placed while yet steaming. There is some danger in killing the cement with such boiling hot water The temperature of the water should not exceed 130 deg. F. at the most, preferably to 120 deg. F. Ordinarily the heat cannot be so great as to injure the material itself, but it may kill the cement by hastening its set to such an extent as to cause trouble or to so dry out the broken stone that it will absorb enough water to rob the cement of necessary moisture in dry mixtures.

Heating Aggregates

Aggregates may be heated by means of a steam coil placed near the cars that are being unloaded by simply throwing the material on the steam coil and allowing the sand and gravel or broken stone to remain a sufficient length of time to absorb the necessary amount of heat. The cement may be warmed by piling the bags on top of the sand and gravel pile.

Another method of heating the aggregates is by means of a large salamander. This may be accomplished by providing a double bottom of sheet metal to a supply hopper of sufficient capacity to store at least a day's run. The heat from the salamander is thus led into the air space directly under the aggregates and the necessary draft is supplied by chimneys passing through the aggregates.

Salamanders or heating grates may be placed under the floor being concreted after encasing the building with canvas or boards. A uniform temperature of about 60 deg. F. should be kept up. Do not allow intense heat to come in contact with the concrete, as it will dry out the concrete before it has set.

When the temperature is below freezing and above 20 deg. F., the concreting may be carried on by using boiling water for mixing (tests should, however, be made to determine whether the hot water does not injure that particular brand of cement, in regard to strength) and by pouring boiling water on the forms, and especially the reinforcement, so that not a particle of ice or snow remains

For heating water the common practice of relying upon a steam pipe placed in an ordinary barrel should not be permitted as the water is generally used too fast to permit of its being properly heated by this method. A suitable tank should be provided, and the water heated by means of a coil supplied with steam from the boiler supplying the mixer engine or when this is inadequate one should be erected for this purpose.

The contractor is hereby cautioned in mixing concrete against killing the cement with boiling hot water. Do not overheat the water to be used for mixing. Use some common sense and you will not be likely to overdo it. The sand and broken stone or gravel should first be mixed with hot water in order to take the frost out of the aggregate and warm it up and reduce the temperature of the water down to 120 or 130 deg. F., which will not injure the cement.

Use of Common Salt

Only those substances that have no effect on the strength and durability of the concrete should be used to reduce its freezing point. Salt dissolved in the water used in mixing concrete helps to prevent freezing by lowering the freezing point. The excessive use of salt for this purpose should not be permitted. Where other materials, such as glycerine, alcohol and sugar, are proposed for the purpose of lowering the freezing point of water, they should be used with caution, owing to a tendency to lower the strength of mortar. The approval of the engineer should be obtained before their use is permitted.

When sodium chloride (common salt) is added to prevent freezing, the amount should not exceed 10 per cent. of the weight of the water. A 5-per cent. solution of common salt is ordinarly used and is not detrimental to the strength of the concrete where so used. The salt should be thoroughly dissolved in the water before mixing the concrete—approximately one pound of salt to every 18 gallons of water when the thermometer is at 32 deg. F., and one additional ounce of salt for every further degree below 32.

Salt is sometimes added in sufficient quantity to "float an egg" or to "float a potato." Such determinations are untrustworthy—it takes about 15 per cent. of salt to the weight of water to "float a potato" and about 11 per cent. to "float an egg." The salt addition should be determined by actual weight and not guessed at.

The difference in temperature between freezing point and the temperature likely to be encountered before the concrete sets should be the amount of salt, expressed in percentage of the amount of water by weight to be used. In other words, approximately 1 per cent. by weight of salt to the weight of the water should be required for each degree F. below freezing, but not more than 10 per cent. should be permitted under any circumstances and this amount will not be considered effective for temperatures lower than 22 deg. F.

Calcium chloride should not be added in quantities exceeding 2 per cent. of the weight of the cement when used as an agent for lowering the freezing point of the concrete. In other words, dissolve in the water needed to properly mix the concrete two pounds of calcium chloride for each bag of cement used. The use of chloride of calcium in concrete should be used by special arrangement and under the supervision of the engineer. If a larger quantity than stated below is used, it is likely to so hasten the set as to make the concrete difficult to handle. Calcium chloride has an advantage over common salt in that it reduces the freezing to a lower point.

(Concluded in next issue)

Regulations for Reinforced Concrete

Ordinances recently passed by the Cities of New York and Cleveland which embody Satisfactory Principles of Design and Construction

A new set of building regulations for reinforced concrete has been adopted by the Superintendents of Buildings of all the five boroughs of New York City, which took effect on January 1, 1912. Uniform regulations of this nature have never before been adopted to apply to all the boroughs of the city. The regulations are as follows:—

1. The term reinforced concrete in these regulations shall be understood to mean an approved concrete mixture reinforced by steel of any shape.

2. Reinforced concrete will be approved for all types of construction if the design is in accordance with good engineering practice and stresses are figured as required by these regulations.

3. Before permission to erect any reinforced concrete structure is granted, complete drawings and specifications must be filed with the superintendent of buildings, showing all details of the construction, the size and position of steel reinforcement, and the composition of the concrete.

4. The concrete for reinforced concrete structures shall consist of a wet mixture of 1 part of cement to not more than 6 parts of aggregate, fine and coarse, either in the proportion of 1 part of cement, 2 parts of sand and 4 parts of stone or gravel, or in such proportion that the resistance of the concrete to crushing shall not be less than 2,400 lb. per square inch after hardening for 28 days.

5. Only Portland cement meeting the standard specifications for cement of the American Society of Testing Materials shall be used in reinforced concrete structures.

6. Fine aggregates shall consist of sand, crushed stone or gravel screenings, passing when dry a screen having ¼-in. diameter holes, and not more than 6 per cent. passing a sieve having 100 meshes per lineal inch. It shall be clean and free from vegetable loam or other deleterious matter.

7. Mortars composed of 1 part Portland cement and 3 parts of fine aggregate by weight when made into briquettes should show a tensile strength of at least 240 lb. per square inch at 28 days.

8. Coarse aggregate shall consist of crushed stone or gravel, which is retained on a screen having ¼-in. diameter holes and graded in size from small to large particles. The maximum size shall be such that all the aggregate will pass through a 1-in. diameter ring. The particles shall be clean, hard, durable, and free from all deleterious material.

9. Steel for reinforcement of concrete shall meet the requirements of the standard specifications for steel reinforcement of the American Railway Engineering and Maintenance of Way Association.

10. Wire used for column hoops shall be drawn from openhearth billets and shall have an ultimate tensile strength of not less than 85,000 lbs. per square inch.

11. The span length for beams and slabs shall be taken as the distance from centre to centre of supports, but need not be taken to exceed the clear span plus the depth of beam or slab. Brackets shall not be considered as reducing the clear span.

12. Length of columns shall be taken as the maximum unsupported length.

13. All reinforcement shall be accurately located and secured against displacement. The reinforcement for slabs shall not be spaced farther apart than two and one-half times the thickness of the slab.

14. Slabs shall not be less than 4 inches in thickness for floor and 3½ inches for roofs.

15. As a basis for calculations for the strength of girders, beams and slabs the following assumptions shall be made:

(a) A plane section before bending remains plane after bending.

(b) The modulus of elasticity of concrete in compression remains constant within limits of working stresses fixed in these regulations.

(c) The adhesion between concrete and reinforcement is perfect.

(d) The ratio of the modulus of elasticity of steel to the modulus of elasticity of concrete is 15.

(e) Concrete has no value in resistance to tension

(f) Initial stress in the reinforcement due to contraction or expansion in the concrete is negligible.

16. The bending moment of slabs uniformly loaded and simply supported shall be taken as ⅛ W1, where W = total load and 1 = span.

17. The bending moments at the centre and at intermediate supports of floor slabs continuous over two or more supports shall be taken as 1/12 W1.

18. The bending moments of slabs that are reinforced in both directions and supported on four sides and fully reinforced over the supports (the reinforcement passing into the adjoining slabs) may be taken as 1/F W1 for loads in each direction. in which F = 8 when the slab under consideration is not continuous or when continuous over one support, and F = 12 at both centre and supports when the slab is continuous over both supports. The distribution of the loads shall be determined by the formula,

$$r = \frac{1^4}{1^4+b^4}$$

in which r equals proportion of load carried by the transverse reinforcement, 1 equals length and b equals breadth of slab.

19. Simply supported beams shall be considered as simple beams with bending moments of ⅛ W1.

20. Beams supported at one end and continuous at the other shall be considered as partially restrained with a bending moment of 1/10 W1 at the centre and ⅛ W1 over intermediate support.

21. Beams supporting rectangular slabs reinforced in both directions shall be assumed to take the proportions of load as determined by the formula in section 18.

22. The bending moments at centre and support of beams or girders continuous over two or more supports shall be taken at 1/12 W1.

23. The bending moments due to other than uniformly distributed loads shall be computed according to accepted theory.

24. Where adequate bond between slab and web of beam is provided, the slab may be considered as in integral part of the beam provided its effective width shall not exceed on either side of the beam one-sixth of the span length of the beam nor be greater than six times the thickness of the slab on either side of the beam, the measurements being taken from edge of web.

25. Members of web reinforcement shall be so designed as to adequately take up all involved stresses throughout

their entire length. They shall not be spaced to exceed three-fourths of the depth of the beam in that portion where the web stresses exceed the allowable value of concrete in shear. Web reinforcement, unless rigidly attached, shall be placed at right angles to the axis of the beam and carried around the extreme tension member.

26. Reinforced concrete structures shall be so designed that the stresses in the concrete and steel shall not exceed the following limits.

	Per sq. in.
Extreme fiber stress on concrete in compression.	650 lb.
Concrete in direct compression..	500 lb.
Shearing stress in concrete when all diagonal tension is resisted by steel..	150 lb.
Shearing stress in concrete when diagonal tension is not resisted by steel..	40 lb.
Bond stress between concrete and reinforcing bars	80 lb.
Tensile stress in steel reinforcement	16,000 lb.
Tensile stress in cold drawn steel wire used as column hooping	20,000 lb.

In continuous beams the extreme fiber stress on concrete in compression may be increased 15 per cent. adjacent to supports.

27. Axial compression in columns without hoops, bands or spirals, and with not less than one-half per cent. nor more than four per cent. of vertical reinforcement secured against lateral displacement by steel ties placed not farther apart than 15 diameters of the rods nor more than 12 in., shall not exceed 500 lb. per square inch on the concrete nor 6,000 lb. per square inch on the vertical reinforcement.

28. Axial compression in columns with not less than one per cent. of hoops or spirals spaced not farther apart than one-sixth of the diameter of enclosed column and in no case more than three inches, and with not less than one or more than four per cent. of vertical reinforcement, shall not exceed 725 lb. per square inch on the concrete within the hoops or spirals nor 8,700 lb. per square inch on the vertical reinforcement.

29. Axial compression in structural steel columns thoroughly encased in concrete having a minimum thickness of four inches and reinforced with not less than one per cent. of hoops or spirals spaced not more than 12 inches apart may be taken at 16,000 lb. per square inch on the net section of the structural steel, no allowance being made for the concrete casing. The hoops or spirals of the concrete casing shall be placed not nearer than one inch from the structural steel or the outer surface of the concrete. The ratio of length to least radius of gyration of the structural steel section shall not exceed 120.

30. In reinforced concrete columns the compression on the concrete may be increased twenty per cent. when the fine and coarse aggregates are carefully selected and the proportion of cement to total aggregate is increased to 1 part of cement to not more than 4½ parts of aggregate, fine and coarse, either in proportion of 1 part of cement, 1½ parts of sand and 3 parts of stone or gravel, or in such proportion as will secure the maximum density.

31 The vertical steel bars in reinforced concrete columns shall bear squarely on steel plates or casting bedded on top of the footing.

32. Bending stresses due to eccentric loads shall be provided for by increasing the section of concrete or steel until the maximum stress shall not exceed the allowable working stress.

33. Whenever it is necessary to splice bars, the connections between them shall be of sufficient strength to carry the stress.

34. In columns, the splicing of longitudinals, having an area less than 1¼ square inches, may be done by lapping, the lapped bars to be wired securely to each other. Longitudinals having areas in excess of 1¼ square inches shall be spliced by butting the bars squarely one over the other and tieing the same securely together by some mechanical means that will not utilize the adhesive strength of the concrete. All such splices shall be made above floor levels, but not more than 12 inches above the same.

35. In columns the ratio of length to least side or diameter shall not exceed 15, but in no case shall the least side of diameter be less than 12 inches.

36. The concrete members of floor construction in which hollow tiles, concrete blocks or other fillers are used, in combination with reinforced concrete, shall be designed in accordance with these regulations, except that the slab portion cast on top of the fillers may have a minimum thickness of 2½ inches provided the fillers do not exceed sixty per cent. of the construction.

37. Exterior and interior bearing and enclosure walls of reinforced concrete, supporting floor and roof loads, shall be securely anchored at all floors, and of such thickness that the compressive stress shall not exceed 250 lb. per square inch., but in no case less than 8 inches. The thickness shall not be less than one-twentieth of the unsupported height. Steel reinforcement shall be placed near both faces of the wall, running both horizontally and vertically and weighing not less than ½ lb. per square foot of wall.

38. Footings for walls and columns may be constructed of reinforced concrete provided the working stresses for concrete and steel are not exceeded and the steel is protected by at least four inches of concrete.

39. The steel reinforcement in columns and girders shall be protected by a minimum of 2 inches of concrete; in beams and walls by a minimum of 1½ inches; and in floor slabs by a minimum of 1 inch of concrete.

40. The contractor may be required to make load tests on any portion of a reinforced concrete structure within the reasonable time after erection. The tests shall be made under the direction of the superintendent of buildings, and shall show that the construction will sustain safely a load of twice the live load for which it was designed.

41. These regulations do not apply to any construction for which provision is otherwise made in the building code.

REGULATIONS FOR CONCRETE BUILDINGS, CLEVELAND, OHIO

Following the collapse of the Henke Building in Cleveland, Ohio, on November 21, 1910, a concerted effort was made by the building interests of Cleveland to bring about the promulgation of a city building ordinance which would embrace the latest knowledge of the science of reinforced concrete design and construction. Mainly as a result of this effort, an amendment to the Building Code of the City of Cleveland has recently (December 13, 1911) been signed by the Mayor and put into force. This amendment relates specifically to "Reinforced Concrete Construction" and "Concrete Block Construction" and governs all building work where concrete is used.

We reproduce below the larger part of the "Reinforced Concrete Construction" portion of the ordinance. It is particularly complete and in sharp distinction to the loose official rules on concrete that have been in vogue in Cleveland and are still in effect in most municipalities. Particular note should be taken of the moment provisions, the flat-slab rules, the sections on hooped columns and the mandatory provisions for a competent inspector on every job.

Reinforced Concrete Construction

Definition.—By reinforced concrete is meant concrete in which steel is embedded in such a position that it shall resist all tensile stresses and assist in the resistance of shear along proper structural lines so that the stresses in the combination can be ascertained by computation and verified by tests.

The concrete shall be mixed in such proportion and so handled that after it is placed in the forms, all voids in the aggregate will be filled with mortar and all voids in the mortar filled with cement. Thirty days after mixing, it shall develop a crushing strength of 2,000 lb. per square in. by testing a 6-inch cube.

Drawings.—Before a permit shall be issued for a reinforced concrete building or structure, complete working drawings, details and specifications shall be filed with the Department of Buildings, giving the size and location of members, the size and position of reinforcing rods, stirrups, bent rods and any other information necessary for the proper calculation of the structure or building. The Department of Buildings reserves the right to demand that the owner, architect or engineer submit a certified copy of such computation or stress sheets for examination upon application for a building permit.

The Department of Buildings in granting a permit to erect any reinforced concrete structure does not in any manner pass the construction until after tests have been made of the actual construction to their satisfaction

Unit Stresses.—The following unit working stresses shall not be exceeded:—

	lbs. per sq. in.
Iron in tension	12,000
Medium steel in tension	16,000
High carbon steel in tension	18,000
Cold twisted medium steel in tension	18,000
Steel to resist diagonal tension	10,000
Concrete in direct compression	500
Concrete in direct compression (spiral reinforced columns)	650
Concrete—Extreme fiber in compression	700
(As determined by the straight-line formula).	
Bond stresses for plain high-carbon bars	70
Bond stresses for plain low-carbon bars	50
Bond stresses for twisted or deformed bars	100
Concrete in diagonal tension	40

(Note—The compressive stress in the steel shall not exceed the product of the compressive stress in the concrete multiplied by the elastic modulus of the steel and divided by the elastic modulus of the concrete).

Slab Beams and Girders

All reinforced-concrete work shall be designed in accordance with standard engineering practice and the following assumptions:

That the ratio of moduli of elasticity of concrete to steel is 1 to 15. That the adhesion of the concrete to the steel makes the two materials act together. That tensile stresses are taken by the steel and that the stress-strain curve of concrete in comparison is a straight line.

Beams, slabs and girders shall be calculated as continuous unless constructed so as to act as simple beams. When continuous for uniform loads, the bending moment at the center shall be figured as not less than $W\ l^2 \div 10$ for the intermediate spans and $W\ l^2 \div 9$ for the end spans, provided at least 66 per cent. as much reinforcement is provided at the top over supports as at the center of the member, and the reinforcement extends beyond the support a sufficient distance to insure proper bond.

In all cases, however, beams and girders which are built monolithic at the supports shall have at least 20 per cent. as much steel in the top over supports as at the center. For concentrated loads on continuous beams or girders, the bending moment at the center shall be calculated as for a simple beam, and this moment may be reduced 20 per cent. for intermediate spans or 10 per cent. for end spans.

Where a short span adjoins a long span and one-half of the short span considered as a cantilever cannot produce a bending moment which will develop the strength of the reinforcement over the supports, the long span shall be considered as an end span.

For simple girders, beams or slabs the span shall be taken as the clear span and for continuous girders, beams or slabs, the span shall be taken as the distance between centers of supports.

T-Beams—When beams are made monolithic with the floor slab a portion of the floor may be assumed as acting in flexure in combination with the beam.

The width of the slab so acting in flexure is to be governed by the shearing resistance between slab and beam, but limited to a width equal to one-third of the span length of the beams between supports, and also limited to a span length of three-quarters of the distance from center to center between beams.

No part of the slab shall be considered as a portion of the rib, unless the slab and rib are cast at the same time.

Where reinforced-concrete girders support reinforced-concrete beams, the portion of the floor slab acting as flange to the girder must be reinforced with rods near the top at right angles to the girder, to enable it to transmit local loads directly to the girder and not through the beams.

Web Stresses—Where the diagonal tension exceeds 40 lb. per sq. in., additional web reinforcement of approved design shall be used.

Stirrups shall not be placed further apart than two-thirds if they are considered as adding to the shearing resistance. In no case shall the shear exceed 125 lb. per sq. in.

When reinforcement is used to increase the unit shear, the proportion of the unit shear taken by the concrete shall not exceed 40 lb. per sq. in., and the reinforcement shall be sufficient to take the remainder. If unattached stirrups are used they shall pass under the main reinforcing bars.

There shall be sufficient anchorage to develop the stirrups above the neutral axis of the beams without exceeding the bond stresses specified. If the stirrups are attached to the reinforcing bars the connection must be sufficient to develop the elastic limit of the steel without causing slipping along the main bars.

If the reinforcing rods are bent up approximately 45° and are spaced no further apart than "d," where "d" equals the effective depth, or if the bars are bent at the quarter points, they may be figured as shear members in providing for the excess shear over 40 lb. per sq. in.

Rectangular Slabs—For square slabs with two-way reinforcements, the bending moment at the center of the slab shall not be less than $W\ l^2 \div 20$ for intermediate spans, and $W\ l^2 \div 18$ for the end spans.

The moment over supports shall be not less than $W\ l^2 \div 30$, and the sum of the moments over one support and at the center of the span shall be taken not less than $W\ l^2 \div 10$, in which above formula "W" is the load per linear foot and "l" the length of span.

For square or rectangular slabs the distribution of the loads in the two directions shall be inversely as the cubes of the two dimensions.

Flat Slab Construction—The type of construction referred to in this section is a design of reinforced-concrete slab supported by reinforced or structural-steel columns with flaring heads and in which beams and girders are eliminated.

This construction shall be figured with a bending moment in any quadrant over the column head of not less than
$W\ l^2$
—— in foot-pounds, in which W equals total weight per
27

square foot, dead and live load, and 1 equals length in feet of a side of an equivalent square in rectangular panels and the side of a square in square panels. This length shall be taken center to center of columns. In calculating the required area of steel in each band at the center of the span, the length of span of band shall be taken center to center of columns in the above formula. The bands of reinforcement shall be made approximately 7/16 l in width. In solving for the required area of steel over the column head, the distance from the compressive face to the plane of steel assumed shall be from the center of gravity of all the steel to the under side of slab. Any additional steel required over the column head shall extend beyond the center of column a distance not less than 0.3 l in all directions.

The radial bars may be assumed as resisting tension provided they are carried a distance horizontally not less than 0.1 l each way before bending downward; further, that the allowed area of each radial bar figured to resist tension shall constitute not over one-half the area of any single band of continuous reinforcement.

The diameter of interior spirally reinforced concrete columns shall never be less than $\frac{1}{13}$ for floors, or $\frac{1}{14}$ for roofs and the diameter of column head shall never be less than 0.2 l. and this head, if constructed of concrete, shall be dropped below the under side of slab at least 3 in. at the outer edge.

Rectangular panels shall never be less in thickness than 1/45 diagonal distance from center to center of columns, for floors, and not less than 1/50 for roofs.

The minimum thickness of slabs shall be 6½ in. for floors and 6 in. for roofs.

The required percentage of steel in a single layer of bars shall not exceed 0.44 per cent. for medium steel, or 0.36 per cent. for high-carbon steel. In any flat slab type of construction provision shall be made to take care of circumferential stresses.

In end or wall panels in which wall columns of reinforced concrete with heads are omitted, allowance shall be made for the increased moments. These moments shall be assumed to be 10 per cent. greater than the moments in the interior panels.

If wall columns are used they shall be calculated to carry one-half the panel load plus any other loads and, if necessary, the column shall be designed for eccentric loadings. The wall beams shall be designed to carry-one-third of the panel load plus any other loads. The minimum width of wall beams of reinforced concrete shall be 12 in., and never less than one-half the depth of beam.

Minimum Thickness of Slabs—Reinforced-concrete slabs shall not be less than four in. thick for floors and 3 in. for roofs.

Columns

In all buildings hereafter to be erected all interior columns shall have spiral and vertical reinforcement, or shall have columns built of structural steel encased in concrete, and the slab steel shall be so placed that it comes near the top of slab at the columns and shall be held firmly in position in such a manner that the bars cannot be displaced. A spacing and clamping device satisfactory to the Department of Buildings shall be used for the floor slab steel.

Reinforced-concrete columns shall not exceed in length 15 times the least side or diameter, and where such columns exceed 12 times the least diameter or side, the allowable compression of the concrete shall be taken as 500 lb. multiplied by the least side or diameter of the column in inches and divided by the unsupported length in feet.

For columns subject to eccentric loading or bending of an indeterminate amount, the above stress shall be reduced at least 20 per cent. When the banding stresses in a column can be definitely determined, the combined bending and direct stress shall not exceed 500 lb. per sq. in.

Columns with longitudinal rods shall have at least 1 sq. in. of steel in the total area and not less than four rods; and rods shall not be used of a less diameter than ½ in. The area of the longitudinal rods shall not be less than 0.5 per cent. of the required cross-section area of the column and shall not exceed 4 per cent. of the effective cross-sectional area of the column. The longitudinal rods must be tied together to resist outward flexure at intervals not greater than the least width or diameter of column.

The steel hoops shall not be less than ¼ in. diameter and spaced not more than 12 in. apart.

Spiral Reinforcement—Where the reinforcement consists of vertical bars and spiral hooping, the concrete shall not be stressed beyond 650 lb. per sq. in., provided that the amount of vertical reinforcement be not less than the spiral reinforcement nor greater than 5 per cent. of the area within the hooping; that the percentage of the spiral hooping be not less than 0.5 per cent., and not to exceed 1.5 per cent; that the pitch of the spiral be uniform and not greater than one-eighth of the diameter of the column, nor greater than 3 in.; that the spiral be secured to the verticals at every intersection to insure the maintaining of its form and position; that the verticals be spaced so that their distance apart, measured on the circumference, be not greater than 9 in., or one-eighth the circumference of the column within the hooping. In such columns the action of the hooping may be considered equal to 2.4 times its amount taken as vertical reinforcing. No part of the concrete outside of the hooping shall be considered as a part of the effective column section.

Steel Columns Encased in Concrete—Where structural-steel columns in steel-frame structures or structures in which the loads are transmitted directly to steel column, are encased in concrete, the structural steel shall be proportioned to carry the total dead load and fifteen-sixteenths of the total live load that can be transmitted to same and the concrete shall be proportioned to carry one-sixteenth of the live load only; and in no case shall the unit stress in the structural steel exceed 16,000 lb. per sq. in. of net steel section, or shall the unit stress in the concrete exceed 500 lb. per sq. in of net concrete section.

In columns of this design the concrete shall be reinforced with spiral hooping of not less than 0.5 per cent.

The pitch of the spiral shall be uniform and not greater than one-tenth of the diameter of the hooping nor greater than 3 in. The spirals shall be secured at each intersection in such a manner as to insure the maintaining of its form and position.

No part of the concrete outside of the hooping shall be considered as a part of the effective column section.

In latticed or open web structural columns it shall not be necessary to use the hooping specified above.

In buildings with columns of this design the height shall be limited to 16 storeys or 200 ft. in height, provided that the other requirements of this code for buildings of this height are complied with.

All structural steel which is to be encased in concrete shall be wrapped with wire in such a manner as to insure the bonding of the concrete to the steel, and no structural steel which is to be encased in concrete shall be painted or oiled. Before encasing structural steel in concrete, scale or rust of any appreciable amount shall be removed.

Splices—In all buildings hereafter to be erected the column splices shall be made in such a manner as to transmit the stresses for which they are designed. The connections shall be made by turnbuckle, sleeve nut, slip sleeve, or by lapping the rods and bolting together in such a manner that the stresses will be transmitted porperly. If the device used requires the rod to be threaded the effective area shall be taken at the root of the thread. If a slip sleeve is used the rods must have their ends milled or equal. The diameter of the sleeve to be not over one-sixteenth inch larger than the diameter of the rod. Where the bearing is made metal to metal the contact shall be made so as to transmit all stresses properly. Where the rods are in tension due to wind stresses the connection shall be made by means of a positive connection. The use of pipe-sleeve connections is prohibited, unless they fit the rods as above described. All column steel shall set directly in line with the steel below and must be constructed in such a manner as to eliminate any short bends in the steel. The steel reinforcement shall be spliced at such a point above the floor that the bond stress in the rod is developed enough to carry the increased load transmitted to it.

Curtain Walls

Buildings having a complete skeleton construction of steel or of reinforced concrete construction, or a combination of both, may have exterior walls of reinforced concrete 8 in. thick, provided, however, that such walls shall support only their own weight, and that such walls shall have steel reinforcement of not less than 0.3 per cent. in each direction vertically and horizontally, the rods spaced not more than 12 in. centers and wired to each other at each intersection. All bars shall be lapped for a length sufficient to develop their full stress for the allowable unit stress for adhesion. Additional bars shall be set around openings, the verticals wired to the nearest horizontal bars, and the horizontal bars at top and bottom of openings shall be wired to the nearest vertical bars.

The steel rods shall be combined with the concrete and placed where the combination will develop the greatest strength, and the rods shall be staggered or placed and secured so as to resist a pressure of 30 lb. per sq. ft., either from the exterior or from the interior on each and every square foot of each wall panel.

Fireproofing

For the purpose of fire protection the outer surface of reinforcing steel shall be kept away from the surface of the concrete 2 in. in columns and girders, 1½ in. in beams and ¾ in. in slabs.

No reinforcing steel not protected from fire shall be considered as adding to the strength of the construction.

Lime or hard wall plaster shall not be considered as a fireproofing material in reinforced concrete work.

Proportion for Concrete

All reinforced concrete shall be mixed in the proportion of one part Portland cement to two parts clean, sharp sand and not more than four parts aggregate. Where slag or other similar material is used the proportion of aggregate shall be reduced in order to have the voids properly filled. In no case shall more than two parts sand be used to one part cement, and all mixing shall be done by machine, except where limited quantities are required, or where the conditions of the work make hand mixing preferable; hand mixing to be done only when approved by the Department of Buildings. In all mixing the separate ingredients shall be measured and shall be thoroughly mixed and must be uniform in color, appearance and consistency before placing.

Material

Cement.—Only Portland cement shall be used which conforms to the standard specifications of the American Society for Testing Materials.

Sand—The sand used shall be clean, coarse, sharp, natural sand, preferably a mixture of coarse and fine grains with maximum percentage predominating. The maximum percentage of clay or loam shall not exceed 5 per cent., and at least 60 per cent. shall be retained on a 50-mesh sieve, and the sand shall contain at least 90 per cent. silicia.

Aggregate—The aggregate shall consist of hard, broken stone, free from dust, clean gravel, slag or similar material crushed and screened to pass a 1-in. ring and rejected on a ¼-in. ring.

Steel—All steel shall be tested by an approved testing laboratory, and the Department of Buildings may, at any time, demand that certified copies of all test records be submitted to it for examination. All steel used for reinforcing purposes shall comply with the "standard specifications" governing the chemical and physical properties of concrete-reinforcing bars as adopted by the Association of American Steel Manufacturers, 1910, with the following modifications:

All reinforcing steel not rolled from billets shall be rolled from standard section T-rails, and shall comply with the physical tests specified in Paragraph 2 of the above mentioned standard specifications. A complete physical test shall be made, by an approved testing laboratory, of each size of bar to be applied by the manufacturer on the contract from each 10-ton lot or less.

Hot twisted bars, of high-carbon steel, shall be twisted with one complete twist in a length equal to not more than 12 times the thickness of the bar.

The Department of Buildings may demand the owner, builder, contractor, subcontractor or foreman to make, or cause to be made, bending tests in the field, on all grades of reinforcing steel, when in their opinion there is any doubt as to whether the reinforcing steel is up to the standard of these regulations.

These bending tests shall be those specified in the above mentioned "standard specifications."

In filling in concrete around reinforceing steel, the concrete must be worked continuously with suitable tools as it is put in place. Filling the columns completely and puddling afterward will not be permitted. In placing the concrete the work shall be so laid out that partially set concrete will not be subjected to shocks from men wheeling or handling material over it. Concrete placed in warm weather shall be drenched with water twice daily, Sundays included, during the first week after being put in place.

When it is not possible to cast an entire structure in one operation, the work should be stopped; for columns at the underside of girders; for girders at a point midway between supports, unless a beam should occur at this point, in which case the joint should be offset a distance equal to twice the width of the beam; for slabs at the center of the span.

When work is resumed the concrete previously placed shall be cleared of all foreign material, drenched and slushed with a mortar composed of one part cement and one part sand.

Beams and girders shall not be constructed over freshly placed columns without permitting a period of 10 hours to elapse to provide for settlement of shrinkage in columns.

Before resuming work the top of the column shall be cleansed of foreign matter, and if the column has become hard, the top shall be wet and slushed with the cement grout above specified.

When beams are designed as T-beams, the slab shall be poured at the same time as the web.

Some means satisfactory to the Department of Buildings shall be used to hold the reinforcing steel in its proper position by means of a spacing and clamping device.

The longitudinal steel in beams and girders shall be so disposed that there shall be a thickness of concrete between the separate pieces of steel of not less than 1½ times the maximum sectional dimensions of the steel.

When steel is used in the compressive side of beams and girders, the rods shall be tied in accordance with requirements of vertical reinforced columns, with stirrups connecting with the tension rods of the beams or girders.

Freezing Weather

When concrete is placed in freezing weather, the materials must be heated and such provisions made that the concrete can be put in place without freezing.

The use of frozen, lumpy sand or aggregate depending on hot water used in mixing to thaw it, will not be permitted. All reinforced concrete shall be kept at a temperature above freezing for at least 48 hours after being put in place. All forms under concrete placed in freezing weather shall remain until all evidences of frost are removed from the concrete and the natural hardening of the concrete has proceeded to the point of safety.

Centering and Forms

All forms shall be built in a substantial manner, plumb and true, with tight joints, so that no appreciable part of the concrete mixture can escape, and shall be so supported and braced that they will carry all the usual loads which may come upon them without springing or deflection.

An opening shall be left at the bottom of all column forms for cleaning and adjusting the steel. This opening shall not be closed until all is in readiness for pouring the columns. The forms shall be carefully cleaned just before concreting, and all chips, ice and other foreign matter removed.

Before removing the shores under any beam or girder the columns supporting it shall be stripped so that the columns may be examined on all sides. Pouring columns in chases left in the masonry shall not be allowed.

Provided ample shores are used to carry the full weight of the floor, column forms may be removed in not less than four days after pouring.

The time which shall elapse before removing the shores under beams and girders varies with the design and condition of the weather, but in no case shall they be removed in less than three weeks after pouring, provided that the beams and girders carry their own weight only. Where beams and girders carry construction loads from above, sufficient shoring shall be left in place to carry these loads until the completion of the work.

The supports under floor slabs shall not be removed in less than 10 days after pouring, but this clause is not intended to prevent removing the joists and lagging in less time, provided the slabs are kept properly shored up.

Inspection and Tests

When any reinforced concrete is used in construction, the owner shall provide for the inspection of cement and inerts, as required by the Inspector of Buildings. Unless otherwise authorized in writing by the Inspector of Buildings, the owner shall also provide a special inspector of the work who shall be satisfactory at all times to the Inspector of Buildings, and who shall be on the work continually during the mixing and the placing of concrete and steel and the removal of forms. Such special inspector shall make daily written reports to the Inspector of Buildings on the progress of the work.

Before reinforced-concrete work is started, the owner shall name in writing the special inspector, and such special inspector shall pass such examination as may be required by the Inspector of Buildings to determine his competency.

Before a building containing reinforced-concrete floors is occupied, the floors shall be tested by applying a load equal to two and one-half times the figured live load to such parts as the Inspector of Buildings or deputies may select. The floor shall sustain this load for at least 24 hours, without cracking or other evident signs of failure.

Recent Legal Decisions

Liability of Sub-Contractor

Mr. Justice Archer, Montreal, on Jan. 24, delivered judgment in the case of Colin Hassam v. the Structural Steel Company, awarding $250 on account of an accident which occurred in the course of the construction of the Dominion Express Company's building, Montreal. The question in dispute as to whether a general contractor was responsible for injuries to an employee as the result of the negligence of a sub-contractor or his agents. The Judge held that the sub-contractor was liable.

The case for the plaintiff was that he was at work on the third storey of the structure when he was hit on the head by a heavy wrench which fell from the hand of one of the steel workers engaged on the upper storeys. He claimed $2,000 damages, alleging that he had been incapacitated from work for a considerable period as a result of the mishap, which he represented to have been due to the negligence of the employees of the defendant company. The latter in its plea alleged that, if any accident had taken place, it was due to the lack of skill on the part of the plaintiff, who, though supposed to be an experienced workman, had placed himself in a dangerous position. Defendants further pleaded that, at any rate, if damages were found, the general contractors of the building, Messrs. Peter Lyall & Co., should be held liable. They finally maintained that, granting the fact of the mishap, the plaintiff, by reason of his occupation, had rendered himself liable to such accidents.

The Judge placed the responsibility solely on the dedendant, but reduced the amount claimed.

Interesting Municipal Action

A question of considerable interest to municipalities and water companies has been argued before Mr. Justice Laurendeau in Montreal. It involves the principle whether land occupied by pipes, hydrants, and the general equipment of a water company can be classed as taxable real estate. The case is that of the School Municipality of St. Cunegonde vs. the Montreal Water & Power Company, plaintiff seeking recovery of a total sum of $4,190 from defendant, on the score of school assessment. Plaintiff in support of its contentions represent that, as a duly constituted commission existing for the purpose of providing educational facilities for a certain population comprised within a well defined area, it has the power to levy taxes on all property comprised within the territory over which it has jurisdiction. The water system, of defendant, it contends, cannot be considered in any other light than that of property. Hence, contends plaintiff, it has a right to levy taxes thereon. In reply, defendant, whilst admitting, in general, the power of plaintiff to tax property, contends that such power must be given strict interpretation. According to law, taxable property might be described as land, vacant or otherwise, occupied or possessed by one individual or by several individuals conjointly. Such definition included all buildings or improvements on the land in question. Thus, as the "holdings" of the defendant were made up simply and solely of water supply equipment, situated beneath public highways, they could not be taken in the light of taxable property. The land on or under which pipes were laid, being public property, was not taxable, and, moreover, the pipes themselves could not be declared to be buildings, nor could they be legally described as improvements. In support of their various contentions, counsel cited jurisprudence to the effect that ground occupied by the supply equipment of public service corporations could not be held to be "lots" in the sense that they should be considered as amenable to taxation at hands of public bodies duly authorized to levy such taxes. The defendant further alleged that in virtue of a contract entered into with the town of St. Cunegonde in 1891, the municipal water service system was leased to the company for a period of 24 pears, on the express understanding that the leased holdings should be exempt from taxation during the whole of the time covered by the lease. Hence, concluded defendant, the alleged right of the plaintiff municipality was ill-founded.

Private Transactions with Civic Officials

On Wednesday, January 24 the Court of King's Bench in Appeal, Montreal, reversed a judgment of the lower court in the case of Lapointe v. C. Messier, ex-Mayor of the municipality of Delorimer. In 1907 M. Lapointe received a contract for sewers from the town, and needing capital approached the Mayor, Mr. Messier, who agreed to lend him $15,000 on condition that he (Mr. Messier) received $3,000 It was stated that Mr. Lapointe signed a note for the amount and received the money. On the completion of the work he received a cheque for $22,700, of which Messier appropriated $18,000. Lapointe brought action against defendant for the return of the $3,000, on the ground that the Mayor could not be interested in a contract, and that his action in taking the $3,000 was illegal. The court ordered the return of the money to the contractor. The case went to appeal, and the Court of King's Bench has decided that the Mayor could, if he chose, charge the $3,000 for the loan, that it was owing to him, and there was no evidence to show that he had an interest in the contract.

Cancellation of Contract

For several days Mr. Justice Greenshields, at Montreal, was engaged in hearing an action brought by the Supplee Elevators Company, an American concern, against A. E. Rea, who was at one time owner of a big departmental store. The plaintiff sued for $15,500, alleging that it had suffered to this extent as a result of the failure on the part of defendant to sign a contract calling for the installation of several elevators in the departmental store, which was, at the time of the entry of suit, in course of construction. In the course of the hearing, it was stated that negotiations had been entered into between plaintiff and defendant regarding the providing of the elevators in question, but though defendant had consented by letter to give the work to the plaintiff, at a certain figure, subsequent difficulties arose with the result that no actual contract was entered into between the parties.

Plaintiff represented that in the course of July, 1910, it had written to defendant offering to tender for elevator installation work in the Rea Departmental Store. An answer was received from the defendant, and subsequent correspondence evolved into an agreement on the part of defendant to give the work to plaintiff, at a certain figure. However, misunderstanding arose concerning the furnishing of a security bond in connection with the work, and no actual contract was passed between the parties, the work being subsequently given to the Otis-Fensom Company, a rival concern. Plaintiff took exception to this, alleging that there had been conspiracy. Defendant denied the suggestion, and maintained that there had simply been manifested business competition between the two firms, the Otis-Fensom Co. finally securing the contract as it complied with conditions laid down by defendant. The latter contended that it was an understood thing that a security bond should be supplied by the plaintiff before the specifications were prepared. This the plaintiff failed to do, alleging that it was necessary that the actual contract should be first passed between the parties.

The judge, in summing up on Wednesday, January 24, maintained that there was no evidence of conspiracy and that there was sufficient reason for the refusal of defendant to enter into the contract. Hence the suit was dismissed.

Responsibility limited to Municipality

At Montreal recently the Court of Review reversed a decision that had been given in favor of a woman who had been awarded damages against the Laurentide Pulp Company for injuries sustained as a result of a fall on the sidewalk in front of their premises. Complainant contended that the defendant was bound to recompense her, both by by-law and civic enactment, but the company succeeded in establishing clearly that its responsibility ended finally with the municipality as a corporation.

Major G. W. Stephens, president of the Montreal Harbor Commission, and his two colleagues, Mr. C. C. Ballantyne and Mr. L. E. Geoffrion, have outlined a programme of improvements that will consume the $2,000,000 which they expect to secure from the Dominion Government. Two works of national importance are well under way now—the new dry dock near Hochelaga, and the big grain elevator, No. 2. Both of these undertakings, however, will require a considerable portion of the new grant before the year ends. Then there is the pressing need of more shed accommodation for the ocean liners. Foundations for a new shed, No. 16, near the new elevator, were laid before winter set in, and the superstructure will be erected early next summer. It will conform to the style of the other sheds—a two-storcy corrugated iron building on cement foundations. Four other sheds will be erected near Victoria pier. At Tarte pier the two sheds now under construction will be rushed to completion. In addition to its building operations the Commissioners will continue the raising of the shores from Victoria pier eastward, and the protection of the shores by revetment walls of reinforced concrete. The dredging of the river will also continue.

The Canadian Domestic Engineering Company, Limited, of 5 Beaver Hall Square, Montreal, has opened an office in Colonial Building, 41-51 West King street, Toronto. This office is under the personal management of Mr. George Huey, M.E., president and chief consulting engineer for the company, whose specialty is reports, consultations, plans, specifications and supervision of heating, ventilation, plumbing, electrical works, steam and electric power plants, etc. A third office will shortly be opened in the west.

The Board of Arbitration at Brockville, Ont., have fixed the purchase price of the Brockville-Prescott toll road at $17,321. The council proposed to include this stretch of highway in its good roads scheme, hence the expropriation proceedings. During the past year the council graded and metalled 54 miles, besides improving many bridges, all at an outlay of $101,164. The appropriation from the Government will approximately be $33,721.

The profits of the Laprairie Brick Company last year totalled $230,753, making, with the balance brought in, $591,230. Dividends for the year amounted to $390,950, or over 115 per cent. This includes a stock dividend in September of 100 per cent.

Annual Meeting Montreal Builders' Exchange

The Montreal Builders' Exchange held their annual meeting on Monday, Jan. 22, Mr. John Quinlan presiding.

The report submitted by the Secretary, Mr. J. H. Lauer, reviewed in detail the various questions which had been before the members during the past year. The Exchange has maintained a live and progressive attitude during that period. Attention is drawn to the unsatisfactory number of so-called apartment houses, and to the immoral and unjustifiable exemptions to building laws in two of the wards added to the city. The report proceeds: "It is announced that our new building Code proposes to establish three districts with graded restrictions according to the requirements of each section; an absolute fireproof business section; the compulsory erection of water-tanks on direct foundations; and to increase the Building Inspector's staff to ten. All admirable in their way, but absolutely useless in effective protection unless rigidly enforced without fear or favor. This has ever been the weak point in our present by-law—the utter lack of real inspection, due to the physical impossibility of covering a city of this size with an absurdly inadequate staff."

Mr. James Ballantyne

Mr. Joseph Brunet

Mr. Thomas Gilday

After a reference to the notorious under-valuation of building permits, it is stated that as a result of many joint meetings between architects and builders a form of uniform contract and general conditions submitted by the architects for use throughout Quebec has been mutually accepted.

Another subject dealt with is the inadequacy of the Canadian tariff on American building stone. It is pointed out that the American duty against Canadian sawn or dressed stone is 50 per cent, whereas the Canadian duty is only 20 per cent. of the value at quarry, with the result that about $600,000 worth of Indiana and Ohio limestone is annually imported into Canada—not in its raw condition, but "sawn and dressed" ready for the building, with the resulting loss of so much trade to the Canadian cut stone contractors, and so much labor to the stonecutters. The exports of stone from Canada to the U. S. are practically negligible. An influential delegation from this Exchange laid these facts before the Finance Minister last March, but without satisfactory results. A second effort is now being made for a more equal tariff with the present Government, and all interested in Canadian stone and quarries are requested to support this petition."

Attention is called to the success of the noon-hour lunch talks, which have been the means of bringing the members together in friendly contact, and reference is also made to the phenomenal increase in real estate values.

The report concludes:

"While everything points to a continued expansion in building construction, your Directors cannot view without misgiving the present attitude assumed by Labor the world over. On the one hand organized labor has degenerated in some countries into a mere tool of political parties; on the other, into that of unscrupulous and violent anarchists whose favorite weapon is dynamite; and notwithstanding the fact that Labor has never been wanting in wise and judicious leaders, whose sole aim was its true progress and uplift, the great rank-and-file seems everywhere to have got out of hand. Whether this universal chaos is the promise of the beginning of the end of a distorted development of a grand idea, remains to be seen. The ordinary type of trade-union is based on a one-sided idea in that it represents one element only of the trade—the workers. The true unionism will be the inclusion of masters and craftsmen working for the joint good and mutual advancement of both. The way out of the present tangle is not by throwing true unionism overboard, but by substituting a true trade-unionism for a false one."

In a letter expressing regret at his unavoidable absence, Mr. James Ballantyne, the president, stated that the Exchange was moving in the right direction. He would like to see some move made by which the members might get closer together.

The balance-sheet showed receipts of $12,265 and a balance after expenditure of $866.

The following officers were elected for the ensuing year:

President—(Re-elected) Mr. James Ballantyne.

Vice-president—(Re-elected) Mr. Joseph Brunet.

2nd Vice-president—Mr. Thomas Gilday.

Directors—Master Carpenters, Mr. Frank Pauze; concrete contractors, Mr. K. D. Church; electrical contractors, Mr. E. W. Sayer; general and mason contractors, Mr. John Allan; cut stone and brick contractors, Mr. John Quinlan; master painters, Mr. W. E. Potter; master plumbers, Mr. J. R. Meadowcroft; master roofers, Mr. F. H. Barwick; lumber and millwork, Mr. Wm. Rutherford; brick contractors and quarry supplies, Mr. T. A. Morrison; cement and builders' supplies, Mr. Alex. Bremner.

Canadian Consulting Engineers

Charles Brandeis, C. E., Montreal, Que.

Charles Brandeis, of Montreal, civil and electrical engineer, was born in London, Eng., in 1874, and graduated from the City and Guilds of London Central Institute at the age of twenty. After graduating he spent four years as estimating and construction engineer with leading electrical concerns in Austria and Germany. In 1898, immediately after the Spanish-American War he went to the United States and spent two years with the General Electric Company at Schenectady, N. Y., and the Westinghouse Manufacturing Company, Pittsburg, Pa., after which he went to Montreal, where he established connections with the Lachine Rapids Hydraulic Company, with whom he remained for three years. In 1903, when this company amalgamated with the Montreal Light, Heat & Power Company, he decided to branch out for himself.

Mr. Charles Brandeis

In the practice of his profession Mr. Brandeis has been most successful. Among the more important works now being carried out under his supervision as consulting engineer may be mentioned the municipal electric light plant for the town of Verdun, Que., and the electric light and power station of 1,200 h.p. capacity and distribution system for the new Montreal Jail on behalf of the Government of Quebec.

For the last five years Mr. Brandeis has been acting as consulting and chief engineer for the Saraguay Electric & Water Company, of Montreal. This company own waterworks near Montreal and they also supply the city of Montreal and suburbs with light and power, in competition with the Montreal Light, Heat & Power Company. Mr. Brandeis recently furnished the company with plans for a new power house with an ultimate capacity of 20,000 h.p.

Mr. Joseph Fels, of Philadelphia, addressed the members of the Montreal Builders' Exchange at their noon-day talk on Wednesday, Jan. 24. In his speech, which was lightened with humorous touches, Mr. Fels advocated the principles of the single tax, pointing out what he claimed were the advantages of taxing land values. He urged that the adoption of the tax was the true solution of unemployment, and that it was economically sound and would prove beneficial to the whole community. Some dozen or more western cities and towns were in a measure adopting the single tax, and he was hoping for more places to fall in line. Mr. Fels strongly criticized the imposition of a business tax as tending to hamper trade. He hoped the people of Montreal would stick to their harbor as a national asset. Major G. W. Stephens, president of the harbor commission, also spoke, and referred to the big developments in the harbor.

At a recent meeting of the Lethbridge Builders' Exchange the matter of holding a Provincial Convention early in February was discussed. It is expected that the proposition will be supported by the Calgary, Edmonton, Medicine Hat and other exchanges. The Lethbridge Exchange is considering the erection of a new Exchange Building, estimated to cost $50,000. This matter and also the decision as to the Provincial Convention was postponed for the annual meeting of the Exchange, which was scheduled to be held on February 1.

Well Known Civil Engineer Passes Away

After an illness of three months Mr. Matthew Neilson died at his residence, Arlington avenue, Westmount, on January 21, at the age of 59. The immediate cause of death was pleuro-pneumonia. Mr. Neilson was a well-known civil engineer, and was identified with many important Canadian undertakings. During five years he was engaged in construction work through the Rockies for the C. P. R., and was in charge of the work at the Kicking Horse Pass. Afterwards he was appointed divisional engineer of the C. P. R.'s lines in Maine, and then held the position of chief engineer of the Calgary & Edmonton Railway and of the Regina and Long Lake Railway. Mr. Neilson subsequently became manager of the St. John, N.B., Railway, Gas and Electric Company, and on receiving the post of managing director of the Mexican Light, Heat and Power Company took up his residence, about a year ago, in Montreal, where he resided until his death. Up to the time of his last illness, Mr. Neilson was vice-president of the Alberta Central Railway, a branch of the C. P. R., and was consulting engineer for the C. P. R. and the St. John Electric Company. About seven years ago he surveyed for private capitalists a route for a proposed Hudson Bay Railway, but the project fell through. The deceased gentleman, who was a native of Almonte, Ont., is survived by his widow and one son, Mr. Stanley Neilson, of Westmount.

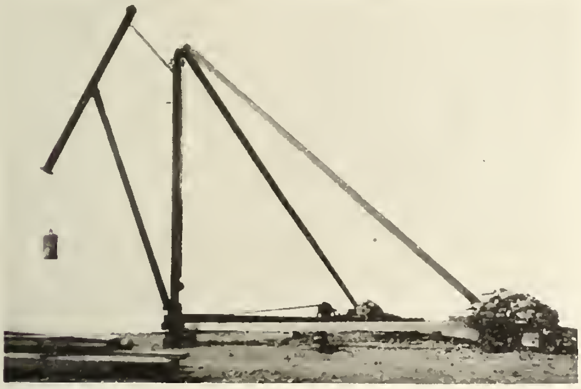
The late Mr. Matthew Neilson

The McVeigh-Dougherty Derrick

A new type of derrick manufactured by the McVeigh-Dougherty Supply & Equipment Company, of Philadelphia, Pa., contains features of outstanding interest to contractors. It is claimed that with this derrick contractors can do their work in one-fifth of the time, with one-half of the horse-power and one-fifth the cable they have been using. It is stated to be the first successful attempt to replace the old figure 4 derrick, one of the simplest and in all probability one of the oldest known types for handling building material. In place of the usual boom and cables, the new derrick has a compound boom made of the ordinary hinged boom with a balanced cross-beam at its top, which is fastened to the top of the mast by a link of steel rods.

The mast and supporting legs are identical with the well-known form of stiff-leg derrick. To the end of the boom is attached the cross-beam, which turns on a pin bearing about its middle point. To the other end of this beam is fastened the pulley over which the cable for raising the load is run; the other end of the beam is fastened to the top of the mast by two steel rods, having pin connections, which permit free movement of the end of the cross-beam.

For ordinary loads but one cable is used to carry and raise the suspended weight, although the end of the beam may be easily equipped with as large a block and as many cables as required. The load cable passes over the top of the beam, over a pulley near its upper end, and thence to the mast and winch.



McVeigh-Dougherty Derrick

The boom is moved by a cable through a single-sheave block from a winch on the derrick mast. If by accident this cable breaks, the boom will not fall with its load, as in the case of the ordinary type, but drops only far enough to bring the load, the cross-beam connecting link and itself into a state of equilibrium.

The derrick is built either of timber or structural steel, and operated by hand, steam or electric power. When built of timber the cross-beam is composed of two timbers bolted together with a steel reinforcing plate vertically between them, which gives the necessary strength and stiffness to this member.

The derrick is easily converted into the standard type by disconnecting the rod links at the top, and folding down the balanced cross-beam until it forms an extension to the boom, where it may be clamped in place, giving the regulation figure 4 derrick, with an extra long boom. The new derrick is made in sizes having a reach of from 17 to 50 ft., and a drift of from 10 to 35 ft. The height of the mast differs from 20 to 55 ft., and the length of the boom from 16½ to 51½ ft.

The McVeigh-Dougherty derrick is claimed to have the advantages of speed, safety and economy on all classes of construction and such merits should certainly be worth the investigation of the Canadian contractor.

Trade Enquiries

The Dominion Government Trade and Commerce Reports contain the following enquiries. Readers of the Contract Record and Engineering Review may obtain the names of enquirers by writing to the Department of Trade and Commerce, Ottawa.

1418. **Metallic Ceilings.**—A large importing firm in Buenos Ayres desires to be placed in touch with manufacturers of metallic ceilings. Quotations must be c.i.f. Buenos Ayres, and shipping weights, etc., must be stated.

1420. **Asbestos roofing.**—A large importing firm in Buenos Ayres desires to be placed in touch with manufacturers of asbestos roofing. Quotations must be c.i.f. Buenos Ayres, and shipping weights, etc., must be stated.

1430. **Patented safety valve.**—A North of England company manufacturing a patented safety valve wishes to get into touch with some Canadian resident firm possessing an established connection with railways, etc., who could act as their representative.

The following are particulars of a portion of the road-building programme of the Quebec Government: Quebec to Montreal, along the northern riverbank, 180 miles; in the interior, 180; Quebec to United States boundary by Sherbrooke, 320 miles; Quebec to Rimouski, 180; Quebec to Gaspe, 300; Quebec to Montreal, south side of St. Lawrence, and by riverbank, 180 miles; another in the interior, 200 miles; St. Joachim to Tadousac, 100; Montreal to United States boundary, 50 miles; to Sherbrooke, 130; to Ottawa, 120; in Lake St. John District, 200 miles. This will leave funds for an additional 1,200 miles.

Acting for Mackenzie & Mann and an English syndicate, Mr. J. M. Fraser, manager of the Atikokan Iron Company, a Mackenzie & Mann concern, has submitted to the city of Port Arthur application for the establishment there of a five-million-dollar plant. The city will give a site of 400 acres at Barepoint and a fixed assessment for twenty years of $50,000, except for school and local improvement taxes. Mr. Fraser estimates that in the iron ore areas of which Mackenzie & Mann have control and for which they are seeking development is ore enough to keep a steel plant running for one hundred and seventy-five years. These include Atikokan, Moose Mountain and Nipigeon areas. The

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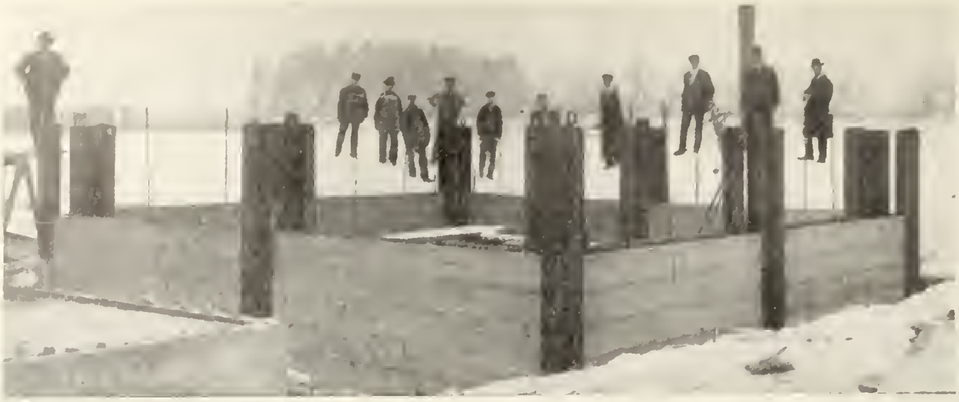
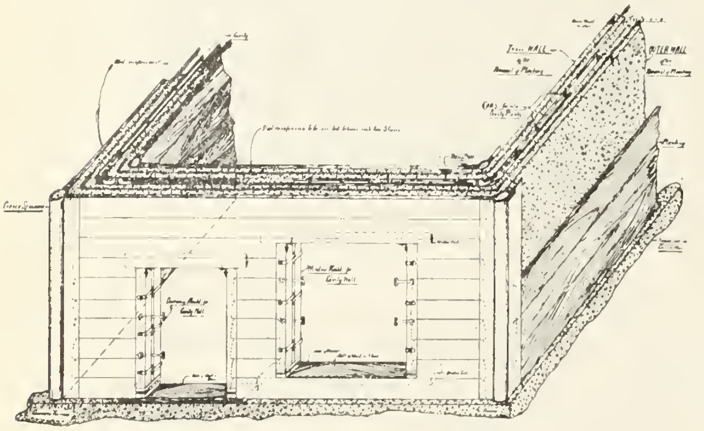
A well-known western engineer, Mr. Bernard W. Murray, died last week at Seattle, Wash. At one time the late Mr. Murray was identified with the city of Victoria, B.C., as Construction Engineer for the water works. Mr. Murray played a prominent part in a number of conspicuous engineering feats among the cities of the Pacific seaboard. An Irishman by birth, he gained his first engineering experience at Liverpool, after which he migrated to New York and from there went straight through to the Pacific Coast and was appointed construction engineer of the Santa Fe railroad. At a later date his abilities were recognized by the United States government which employed him in the construction of the Fort Wingate military outpost, after the completion of which he was similarly employed at other places. To a large extent Seattle became his home town, and it was in that city that he did some of his most notable work.



Roughsedge's patent molds in place previous to removal.

Houses with Cavity-Walls of Poured Concrete

Our Ottawa correspondent recently paid a visit to some interesting work at Hull, Que., where Messrs. Roughsedge & Ramsay are erecting a number of workingmen's houses, according to the patents they have obtained on molds for erecting houses and other buildings with cavity walls of poured-concrete. It is claimed for these molds that they have actually solved in a simple, practical and economical manner the hitherto insuperable difficulty of erecting buildings, of any required size, having double walls of concrete with a continuous cavity, or air-space, between them.



Ground floor elevation showing molds as in use.

These houses differ, in the first place, from those built by Edison, or from any other house molds, in that they consist of two separate walls (with a continuous cavity, or air-space, between them) which can be simultaneously built to the full height of each storey at one casting of "poured" concrete—not the semi-wet mixture.

The great advantages claimed for this method are:—

(1) The cavity being continuous—from the bottom of the basement right up to, and under, the roof and the whole way round between the two solid walls—not only provides perfect insulation against heat and cold, sound and damp, but at the same time enables a better and simpler system of heating and ventilating to be installed than is otherwise possible. This means, besides greatly increased personal comfort at all seasons, a substantial saving in both the winter coal bill and the summer ice bill.

(2) Rapidity in construction—as the molds, being easily handled, strong and portable, can be quickly set up and taken down—and great saving in cost, due to the fact that there is no necessity for plastering, the use of stone and brick is eliminated and the greater part of the heavy carpenter's bill for material and labor is cut out.

(3) The walls, floors, ceilings and roof all being of concrete, the cost of maintenance, repairs and fire insurance is reduced to a minimum.

The chief objection rightly brought against the use of concrete—whether hollow-blocks or solid walls—for houses in Canada, viz.: the impossibility of keeping out the cold and frost of the long, hard winters, is completely overcome by this method of cavity-wall construction. With the real improvement it also effects in the ordinary hygienic and sanitary conditions of the home, there can be little doubt that a new era in house building has now begun.

The Ottawa Concrete Homes Company, Limited, have acquired the patent rights in these molds for Eastern Ontario and are now getting ready for a busy season of house-building by this method.

Basement walls and reinforced concrete floor.—Note the continuous cavity.

Poured concrete dwelling in course of construction.—Built with Roughsedge's patent molds.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Calgary, Alta.

In the annual report, City Engineer recommends installation of asphalt plant.

The following is the Engineer's recommendation for waterworks system: New intake 2½ miles above present intake, 36-in. pipe with 20-in. branch to present intake, $90,000. Sedimentation tanks, $30,000; enlargement and complete lining of reservoir, $85,000; installation of filtration plant, etc., $200,000.

Hamilton, Ont.

Kensington survey will be graded and cement walks laid. Arrangements have been made with city for laying water mains and sewers. Interested, J. Walter Gage, real estate agent, 32 Main street east.

Hensall, Ont.

Corporation of Hensall is contemplating the installation of a new waterworks system. It is stated that the matter will be undertaken as soon as possible. Address John Petty, Reeve.

London, Ont.

Supply of c. i. water pipe is required by the City of London Waterworks Department. Superintendents Glaubitz & Thos. Hodkinson will be in charge, damage amounting to thousands of dollars done to 12-in. and 18-in. water main by electrolysis. Damaged pipe will be replaced by new in the spring.

Montreal, Que.

Tenders are called for supply of 4-in. steel pipe to be delivered at Ahuntsic; specifications at office of superintendent of sewers. Received by Board of Commissioners until noon, January 31. Secretary, L. N. Senecal.

Niagara Falls, Ont.

Corporation of Niagara Falls have appointed a special committee to investigate kind and cost of pavement, estimated cost $50,000. Mayor, C. E. Dores. Clerk, W. J. Seymour; Engineer, J. C. Gardner, Niagara Falls.

North Toronto, Ont.

Town Engineer E. A. James has recommended improvement of Yonge st., cost $185,000; area to be improved, 53, 240 square yards asphalting and curbing estimated to cost $140,000, storm sewers $25,000; altering position of sidewalk, etc., $20,000. Council will consider the project. Mayor, A. J. Brown.

North Vancouver, B.C.

By-law to provide for storage reservoir, cost $75,000; Rice Lake. City Engineer, G. S. Hanes.

Point Grey, B.C.

The by-law to improve roads in Kerrisdale and provide for the purchase of road machinery, carried. Municipal Clerk, H. Floyd. Estimated cost $164,980.

The by-law to expend $257,933 on construction of sewer carried. Municipal Clerk, H. Floyd.

Richmond, B.C.

By-law to authorize borrowing of $100,000 for roads carried by a large majority, and also $50,000 for waterworks.

Ridgetown, Ont.

Tenders are called for one 50 h.p. gas engine; one gasoline engine; 2 half million gal. Triplex pumps; three deep well pumps, etc. Specifications at office of Town Clerk. Received by Clerk until noon, February 14th. Clerk, D. Cochrane. Consulting Engineer, F. W. Farncomb, London, Ont.

Toronto, Ont.

It is the City Council's intention to construct sewers in the following streets: Lane first east of Palmerston avenue, from Ulster street to south end a 12-in. tile pipe sewer, cost $2,380; and Pendrith street from 475 feet west of Christie street to a point 80 feet farther west, a 12-in. tile pipe sewer. Estimated cost $230.

Tenders received by Chairman of Board of Control, City Hall, Toronto, up till noon, January 30th, for the construction of the following sewers: St. Clair avenue, Dufferin street to Lauder avenue; Lauder to Oakwood ave.; Oakwood south to 150 ft. west of Ossington ave.; Ossington to 24 ft. west Christie street; and 240 ft. west Christie to Kenwood ave.; Oakwood ave., Springmount to St. Clair; Arlington ave., Tyrrel to St. Clair; Greenlaw ave., to a point 170 feet east.

A pumping engine with capacity of 15 million gallons per day is to be included in the estimates of the city. Engineer, F. L. Fellowes.

Vancouver, B.C.

A by-law carried for rocking, grading and opening streets, cost $785,000. City Clerk, W. McQueen. City Engineer, F. Fellowes.

The by-law carried for construction of sewers, cost $800,000. City Clerk, W. McQueen. City Engineer, F. Fellowes.

The by-law carried to provide for water extensions, cost $275,000. City Clerk, W. McQueen. City Engineer, F. Fellowes.

By-law for $350,000 carried to construct new water main on Seymour Creek.

Victoria, B.C.

The by-law to obtain water supply from Sooke Lake carried by large majority. The Westholme Lumber Co. will now begin work as soon as the matter of a bond can be arranged.

Waterloo, Ont.

Town of Waterloo Water & Light Commission are contemplating the purchase of two 40 kw. transformers; supply of pipe and fittings for gas and water departments. Action will be taken at once.

Weston, Ont.

T. Aird Murray, Consulting Engineer, Lumsden Bldg., Toronto, has been instructed to prepare plans for proposed sewerage system to cost $60,000.

Winnipeg, Man.

Tenders are called for supply of motor driven pump, capacity, 5,000,000 gallons. Received by Chairman, Board of Control, until March 1st. Secretary, Board of Control, M. Peterson.

Railways, Bridges and Wharves

Lake Quinze, Que.

Tenders are called for construction of dam and sluiceway. Plans, etc., at offices of the district engineers at Toronto and Montreal and on application to postmaster at Haileybury, Ont. Received until 4 p.m., February 15th. Department of Public Works, Ottawa; Secretary, R. C. Desrochers.

Montreal, Que.

Tenders called for machinery and boiler for floating derrick. Plans, etc., on application to Engineer. Received by secretary until noon, January 30th. Owner, Harbor Commissioners; Secretary, D. Seath.

Owen Sound, Ont.

The project to construct a 600 ft. dry dock capable of further extension was endorsed at the last meeting of the Board of Trade. Last spring the ratepayers voted $50,000 in common stock. Further enlargement is in the revised project as well as further concessions from town. Edward Box, London, England, promotor; E. Lemon, Mayor.

Saskatoon, Sask.

Tenders are called for construction of substructure of subway under Canadian Northern Railway Company's tracks. Information on application to Engineers. Tenders received by City Commissioners until 12 a.m., February 23rd. Cost $130,000. City Engineer, G. T. Clark; C. N. R. Bridge Engineer, W. L. Mackenzie, Winnipeg.

Toronto, Ont.

Tenders are called until February 20 for supply of track intersections and other special work layouts. Specifications on application to Department of Railways and Bridges, City Engineer's office.

Upper Salmon River, N. B. (Albert Co.)

Tenders are called for construction of pier; plans, etc., at Department and at offices of District Engineers at St. John and Chatham, N.B., and on application to postmaster at Alma. Received by secretary until 4 p.m., February 14. Department of Public Works, R. C. Desrochers, secretary.

Vancouver, B.C.

By law carried to expend $150.000 on Georgia-Harris bridge. Clerk, W. McQueen; engineers, Waddell & Harrington, 739 Hastings street west.

CONTRACTS AWARDED

Ottawa, Ont.

General contract awarded for Canadian Northern Company to J. P. Mullarkey, Limited, Coristine Bldg., Montreal. Sub-contractors, section between Ottawa and Pembroke, 100 miles, as follows: James MacDonald and J. Brennan, Smith's Falls; Ross & McCoomb, Dw Hill, Ont.; P. J. Brennan, Ottawa, Ont. Other sub-contracts yet to be awarded.

National Transcontinental Railway; general contract awarded to J. P. Mullarkey, Limited, Coristine Bldg., Montreal. Sub-contractors, section between Ottawa and Pembroke, 100 miles, as follows: James Macdonald and J. Brennan, Smith's Falls. Ross & McCoomb, Dwyer Hill, Ont.; P. J. Brennan, Ottawa, Ont. Other sub-contracts yet to be awarded.

Prince Rupert, B.C.

Quarantine station and wharf, cost $60,000, for Dominion Government. Contractors, Naylor Bros., England, represented by P. Naylor. Contract awarded on the 18th inst and include two approaches, wharf and quarantine buildings.

Public Buildings, Churches, Schools, etc.

Arcola, Sask.

Time for receiving tenders has been extended until Feb. 1st for erection of an addition to school. Public School Board; secretary, J. R. Donaldson, S.D. 637, Arcola; architects, Storey & Van Egmond, Regina, Sask. Plans, etc., at office of architects.

Arthur, Ont.

J. D. Callaghan is interested in the proposed erection of a brick public library building to cost $7,500, slate roof, hot water heating; T. E. Langford, secretary Public Library Board.

Belleville, Ont.

A new school and gymnasium are included in the plans for the proposed additions to Deaf & Dumb Institute. Cost $75,000.

Brandon, Man.

A site has been purchased for Masonic Temple on Lorne and 8th street, but it is not thought that work will be commenced this year.

Fort Francis, Ont.

A site has been purchased for the erection of a new public school, cost $20,000. Chairman, Dr. Robert Moore; secretary, Bruce Lloyd. Work will probably commence in the spring.

Guelph, Ont.

Tenders are called for school, cost $9,000, for Separate School Board. Secretary, F. Nunan, Guelph. Architect, W. Mahoney, Guelph. Two storeys, 37 x 50, brick, stone foundation, hot air heating, slate roofing, hardwood floors, steel ceilings, fire escapes, electric work, boilers. Tenders received by secretary until January 29th.

Hamilton, Ont.

E. R. Marshall, 31 West ave., South Hamilton, is interesting local capital in the erection of a Burlesque Theatre on James street.

Barton Street Baptists contemplate erecting a new church on Sherman ave. and Cannon street. Pastor, Rev. E. Burrell, 132 Sanford ave. north.

Tenders are called for alterations to City Hall Basement, cost $20,000. Mayor Geo. H. Lees; architects, Mills & Hutton, Bank of Hamilton Chambers, Hamilton. Basement to be converted into offices; new tile flooring, electric light, elevators, steam heating. Specifications at office of architects. Tenders received by Mayor until noon, January 31st.

Barton & Wentworth Street Churches may amalgamate and erect a new church in the southeastern district.

Lloydminster, Sask.

New tenders are called for construction of building. Plans, etc., at office of J. E. Cyr, Superintendent of Public Buildings for Manitoba; at the Department and at local post office. Received by secretary until 4 p.m., February 7. Department of Public Works, Ottawa; Secretary, R. C. Desrochers.

London, Ont.

Tenders will be called for addition to Aberdeen school, for City of London Board of Education. Four rooms, modern heating plant to be installed.

Board of Education considering a new $125,000 school in South London; also a four-room addition to Aberdeen school, $30,000. To be discussed at next meeting.

Moore & Munroe, London, have prepared plans which call for 1-storey brick church building with basement, 42 x 42, cement facing, for Howlett Methodist Church.

The Ridout Street Metrodists are considering the erection of a new church. Pastor, Rev. W. H. Butt.

Maisonneuve, Que.

The Quebec Legislature has passed an amendment to the Maisonneuve City charter giving it the right to erect a public market costing $150,000, also a public bath, and to issue bonds for contract without submitting by-law to ratepayers.

Montreal, Que.

Dominion Square Methodists plan to erect a new church, cost $100,000. Pastor. Rev. E. I. Hart, Windsor street, Montreal. Present church in Dominion Square has been sold. Trustees looking for new site.

Moose Jaw, Sask.

Tenders are called for erection of Boy's College. Owner, Saskatchewan College Board of Governors; Principal, Mr. Graham. Plans and specifications considered at last meeting. Tenders to be called and opened at the next meeting, February 15th.

North Vancouver, B.C., Lynn Creek P.O.

Tenders are called for erection of a church for Lynn Valley Congregation. Secretary, G. W. Sugden, N. Vancouver, Architects, Dawson & Pentecost, Holden Bldg., Vancouver. Frame Church. Specifications at office of Martinson & Co., Lansdale ave., N. Vancouver or at the Lynn Creek postoffice. Tenders on general contract called until Jan. 25th only.

Ottawa, Ont.

At the annual meeting of McPhail Memorial Church the project of erection of new church was favorably received. Pastor, Rev. W. F. Parker; treasurer, E. C. Hayes.

Port Arthur, Ont.

The council has authorized the building and equipment of fire station.

Regina, Sask.

The Saskatchewan Anti-Tuberculosis League contemplate the erection of a Provincial Sanitorium, cost $100,000. Secretary, Dr. M. M. Seymour, Regina. Medical Superintendent, Dr. Wm. M. Hart, Regina. Mt. J. H. Puntin, New Mackenzie, Brown Block, Scarth street, Regina, is retained as architect.

St. John, N.B.

The St. John Association for Prevention of Tuberculosis has purchased a site for a sanitorium which will be handed over to Municipal Council who will build and maintain the institution.

St. Boniface, Man.

An agreement between railroads, government and city has been signed. It is stated arrangements for plans for stock yards are made. By-law passed at recent election by the citizens, accepting agreement between City and Public Markets, Ltd., controlled by three railway companies, C.P.R., C.N.R. and G.T.P.

St Thomas, Ont.

Plans will be prepared for extension to collegiate for Board of Education. John T. Findlay, architect, St. Thomas, has been instructed to prepare plans at once.

South Vancouver, B.C.

A site has been cleared on Fraser ave. for the erection of church for South Hill Baptist Congregation. Architect. G. A. Horel, 25th and Main streets, Vancouver. Plans submitted to Church Committee. If favorably considered plans will be ready for figuring on about February 15th.

Stratford, Ont.

The council are considering the construction of a ¼-mile track and buildings in the athletic grounds. Aldermen Welsh and Grey are in charge.

Strathcona, Alta.

Tenders are called for erection of public library. Architects, Wilson & Herrald. Two storeys and basement, brick and Roman stone. Ratepayers voted $25,000 on January 10th.

Toronto, Ont.

Provincial Secretary Hanna has announced that a detention hospital will be built in the spring and in the meantime a temporary building will be leased to obviate the necessity of confining insane persons in the Toronto Jail.

Bulk or separate tenders were received in connection with the Balmoral ave. fire hall, by registered post by Chairman of Board of Control until noon, Jan. 30. Hardware, stable fittings, lighting fixtures. Plans at the City Architect's office.

Plans are completed for erection of a church, cost $40,000, on St. Clair ave., for St. Clair Ave. Methodist Congregation. Architects, Wickson & Gregg, 59 Yonge street. Structural steel, reinforced concrete, Credit Valley cut stone, hardwood finish, terra cotta, fire escapes, damp proofing, metallic and tar roofing, galleries.

Jones Ave. Baptist Congregation have purchased property cor. Jones ave. and Danforth road as a site for the erection of a church.

A site has been purchased for the erection of a church, cor. Jane and Annette street, for High Park Methodist Congregation, High Park and Annette street.

A motion was submitted to Board of Education, City Hall, by Trustee Johnson that a school be built between Greenwood and Woodbine avenues, north of C. P. R.

Tenders are called for erection of central building, 30-40 College street and 35-47 Grenville street, for Young Men's Christian Association. Architects, Burke, Horwood & White, 28 Toronto street, Toronto. Received by Chairman, Building Committee, until noon, February 5th.

The present Collegiate building on Jarvis street is considered inadequate, and it is stated that the Property Committee have on hand the selection of a more suitable site. Dr. L. E. Embree, principal.

Plans are in progress for a new Anglican Church, cost $70,000, cor. Lonsdale road and Russell Hill Drive, for Grace Congregation. Architect, Eden Smith & Son, 199 Yonge street. Pastor, Rev. A. J. Broughall, 86 Oxford street. Stone, steam heating, electric lighting, hardwood interior finish, cut stone, art glass, slate roofing.

Vancouver, B.C.

Arrangements are being made for erection of building on Alexander st., for Board of Directors, Strathcona Institute. Construction expected to start in March. Building to be completed before end of year.

Tenders are called for the erection of gymnasium in connection with Provincial Normal School. Plans, etc., at office of Timber Inspector, Vancouver; Government Agent, New Westminster, and at the Department. Received by Minister of Public Works until noon, January 31st. Department of Public Works, Victoria. Public Works Engineer, J. E. Griffith.

The First Presbyterian Church are making arrangements for sale of present property at Gore ave. and Hastings st., the funds raised to be used for the new building in Georgia street. Competitive plans will be called in due course.

City of Vancouver has carried a by-law providing $50,000 for the erection of an Aged People's Home. Clerk, Wm. McQueen.

By-law carried to erect fire hall at a cost of $41,500, in Wards 6, 7, 8.

A by-law carried to provide for the erection of police headquarters, cost $150,000, and also for General Hospital, cost $60,000. City Clerk, W. McQueen.

Walkerville, Ont.

By-law to authorize issuing of debentures to the amount of $8,000 will be submitted to the ratepayers on Feb. 10, for market building and site.

Waterloo, Ont.

Tenders are called until Jan. 31 for interior fittings for Post office. Plans etc. on application to C. G. Moogk, Clerk of Works, Waterloo, Ont. T. A. Hastings Postal Station "F" Toronto, and at the Dept. of Public Works, Ottawa; Secretary, R. C. Desrochers.

Weston, Ont.

Tenders are called for Children's Building, to cost $60,000, for National Sanitarium Association, Weston, Ont. Architect, A. R. Dennison and Stephenson, 20 King west. Brick, concrete and asphalt roofing, steam heating, concrete foundation, electric light, art stone trimmings, mantles and tiles, fire-doors, reinforced concrete floors. Passenger elevator, dumb waiters, kitchen equipment.

Weston, Ont.

A power house to cost $16,000 will be built for National Sanitorium, Weston, Architects, Dennison and Stephenson, 20 King street. Brick, reinforced concrete, art stone trimmings. Tenders on power, lighting, heating and laundry equipment will be called.

Windsor, Ont.

Present market building is inadequate and majority of councillors in favor of new building. Ald. Meritsky Chairman of Market Committee.

Winnipeg, Man.

The date for delivery of preliminary plans in connection with competition for Parliament Buildings is extended to March 31st. Copies of regulations governing competition obtained from Jas. Hartney, 77 York street, Toronto. Cost $2,000,000.

Tenders are called for supply of sashes, doors, etc., for Isolation Hospital. Secretary Board of Control, M. Peterson; architect, H. B. Rugh, 928 Union Bank, Winnipeg. Steel casement and sash, linen chute doors and elevator doors. Received by chairman Board of Control until 11 a.m. February 16th.

Wolfville, N.S.

Acadia University, President, Geo. B. Cuttin, contemplate the erection of a college residence for girls to cost $40,000. The building may be erected in 1912 or 1913.

CONTRACTS AWARDED

Strathcona, Alta.

The tender of Heenan-Frowde Co. for erection of incinerator at $40,200 was accepted. By-law to be voted calls for $50,000. Surplus will be required in purchasing dump carts and other necessary equipment.

Victoria, B. C.

By-law carried for high school to cost $359,950. Contractor, Vancouver Construction Co. Heating and ventilating, Barr & Anderson, 114 Hastings. Plumbing, W. R. Menzies Co., 618 Cormorant street, Victoria. Contractors will begin work about Feb. 15th after the 30 days necessary for legallizing by-law have elapsed.

Residences

Annapolis Royal, N.S.

The Valley Brick & Tile Co., Mgr. L. E. Shaw, contemplate building a boarding house: 2-storey, 75 x 40, frame, brick foundation; Paroid roofing. Tenders will likely be called and construction completed by April 1, 1912.

Calgary, Alta.

A permit has been granted for residence to cost $4,000, Rosedale, for T. Montgomerie, Box 485; 2-storey, 25 x 39, brick veneer, concrete foundation, hot water heating, electric lighting, shingle roofing, hardwood interior finish.

A permit has been granted for two residences to cost $4,000, Hillhurst, for M. Lantz, 304 12th street N. W., 2-sty., 22 x 30, frame, concrete foundation, hot air heating, hardwood interior finish.

Mr. Fox is contemplating the erection of an apartment block in Riverside. Architects, Burroughs & Richards; 3-sty. brick. Cost $35,000.

Edmonton, Alta.

R. Grant, contractor, is interested in the proposed erection of an apartment block to cost $150,000; 6-storey, 250 x 100, brick, concrete foundation, steam heating, electric lighting, tar and gravel roofing, maple floors, electric work, boilers, passenger elevators. Mr. Grant arranging for capital for joint stock company. He will aslo probably draft the plans.

Hamilton, Ont.

Henry Dunham, 18 Albion ave., will build five new houses on Cannon street near Fairholt Road to cost $7,500.

Chalmer's Presbyterian Church are contemplating the erection of a Manse to cost $2,500. Pastor, Rev. A. E. Neilly.

Kitsilano, B.C.

Work will start shortly on the erection of apartments to cost $75,000, near Vancouver, for R. H. Partridge. Architect, F. H. Perkins, 67 Hutchinson Building, Vancouver.

Middletdon, N.S.

W. B. Ross is planning to buill a new brick summer residence to cost $5,000.

Mitchell, Ont.

James Kane has purchased property here and plans to erect a fine residence early in the spring.

Montreal, Que.

Foundation has started for residence and stores to cost $4,300 on Dufferin and Comte streets, for John Paterson & Sons, 188 De Normanville; 2-storey, 50 x 62, wood and brick, gravel and tar paper roofing.

Z. Cecyre, 1613 Labelle street, will build six flats to cost $4,500, Fifth ave., Rosemount Ward. Two storeys, 50 x 57. wood, brick, and cement blocks, stone foundation, stove heating, electric lighting. Work is not yet started.

Ottawa, Ont.

Tenders will be called for residence to cost $2,500 for Alfred Mainville, 49 Mutchmor street, Ottawa; 2-storey, 20 x 24, brick veneer, concrete foundation, hot air heating, electric lighting.

Tenders will be called for residences to cost $3,500 on Chapel street, for S. A. Gogo, 19 Lorne avenue; 2-storey, 30 x 48, double solid brick, concrete foundation, hot air heating, electric lighting.

Orton, Ont.

Separate tenders will be received for erection of a 2-storey brick house until

(Continued on page 63)

Tenders and For Sale Department

To Engineers

Every man who puts in a tender on your jobs has got to see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

More contractors and manufacturers read the "Contract Record" than any other Canadian publication. It is the logical place to look for tenders called, and where all important works are advertised.

Send along your plans for your next job and put a line in your ad. to that effect.

Contract Record

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—441 Seymour Street.

Sewer Excavator

For sale for immediate use, a Vulcan "Little Giant" Steam Shovel with extra long dipper handle for excavating to 16 feet below surface, mounted on traction wheels, dipper 1¼ yd. capacity. Machine just overhauled; new chain, and extra large new boiler; weighs 32 tons; low price. Address

WILLIS SHAW MACHINERY Co.,
39 South LaSalle Street,
42-t.f. Chicago, Ill.

Miracle Cement Block Machine for Sale

We have a Miracle Cement Block Machine for sale, also a tile and brick machine which have been used about three months.

Will dispose of same at a very reasonable figure.

Stinson Reeb Builders' Supply Company, Ltd.,..
Tenth Floor,
Eastern Townships Bank Building,
4-5 Montreal, Que.

City of Calgary, Alberta

Tenders for Bridge

Sealed tenders marked "Tenders for Bridge," addressed to the City Clerk, Calgary, will be received up to noon of **10th February, 1912**, for the supply of material and construction of a Steel Bridge, 30 feet wide, in three spans of 150 feet each, on concrete substructure, across the Bow River, within the city limits.

Plans and full information at the office of the City Engineer, Calgary.

Each tender to be accompanied with a marked bank cheque payable to the City Treasurer for the amount of $500, which will be forfeited should any party whose tender is accepted fail to execute the contract. The cheques of unsuccessful tenderers will be returned.

The lowest or any tender not necessarily accepted.

CITY COMMISSIONERS,
Calgary, Alta.
3-6

Location Wanted

Advertiser desires to learn of good opening in Western Canada for an electrical contractor; would invest some capital or join others in starting a plant. State population of town, particulars and inducements. Box 418, Contract Record, Toronto, Ont. 4-5

Plant for Sale

13 mile 56 and 60 pound rail and fishplates.
10 mile 80 pound rail and angle bar.
Also 16, 20, 30, 40, 50's.
New rail, all sections in stock.
One 10 x 16 Porter Locomotive, Standard gauge.
Sixteen 4-yard Steel Rocker Dump Cars, Standard gauge.
One 45-ton Thew Steam Shovel.
For particulars apply to

J. J. GARTSHORE,
4-5 Toronto, Ont.

New Parliament Buildings
Winnipeg, Man.

The Government of Manitoba will receive competitive drawings for New Parliament Buildings to be erected in the City of Winnipeg.

Copies of regulations governing the competition may be obtained from Mr. James Hartney, 77 York Street, Toronto.

The date for delivery of preliminary plans in connection with above competition is extended to March 31st. 4-5

COLIN H. CAMPBELL,
Minister of Public Works.

TOWN OF SUDBURY
PROVINCE OF ONTARIO

Pumping Station Equipment

Sealed tenders will be received by the Town Clerk until 1 p.m. on **Monday, February 5th, 1912**, for the furnishing and installation of the following equipment:-

Contract "A"—Two (2) Return Tubular Boilers, each 72-in. x 18-ft., together with feed-water heater, boiler feed pump, piping, etc.

Contract "B."—Two Horizontal Compound Duplex Steam Pumps of 900 Imp. gallons capacity each, also one twelve inch Venturi Water Meter, together with piping and accessories.

Instructions to bidders may be had upon application. Plans and specifications may be seen at the office of the Town Clerk.

No tender necessarily accepted.

J. G. HENRY, Esq., Mayor.
GEO. ELLIOTT, Esq., Town Clerk.
GEO. TUDDENHAM, Esq.,
Chairman Water & Light Com.
R. H. MARTINDALE, Superintendent.

CITY OF SASKATOON

Tender for Pavements

Sealed tenders addressed to the City Commissioners, and endorsed "Tender for Pavement," will be received up to **12** o'clock noon on **Friday, February 16th, 1912**, for the construction of approximately 125,750 square yards of Pavements. The Corporation reserves the right to divide the work into three approximately equal Contracts and to reject any or all tenders.

All information may be obtained on application to George T. Clark, City Engineer, Saskatoon, Sask.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., Jan. 13th, 1912 4-5

CITY OF SASKATOON

Tender for Concrete Sidewalks

Sealed tenders addressed to the City Commissioners, and endorsed "Tender for Concrete Sidewalks," will be received up to twelve o'clock noon on Friday, February **16th, 1912**, for the construction of approximately 621,200 square feet of Concrete Walk and 100,950 lineal feet of Curbing.

The Corporation reserves the right to divide the work into three approximately equal Contracts and to reject any or all tenders. All information may be obtained on application to George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., Jan. 13th, 191 4-5

CITY OF SASKATOON

Tender for Substructure 23rd Street Subway

Sealed tenders, addressed to the City Commissioners, and endorsed "Tender, Substructure 23rd Street Subway," will be received up to twelve o'clock on **Friday, February 23rd, 1912**, for the construction of the Substructure for a Subway under the Canadian Northern Railway Company's tracks at 23rd Street, in the City of Saskatoon. The Corporation reserves the right to reject any or all tenders. All information may be obtained on application to W. L. MacKenzie, C. N. R. Bridge Engineer, Winnipeg; George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., Jan. 18th, 1912. 4-5

TENDER FOR
Engines and Pumps

Sealed tenders addressed to D. Cochrane, Clerk of Ridgetown, Ontario, (marked "Tender") will be received up to noon of **February 14th, 1912**, for the following equipment:—One 50 h.p. Gas Engine; one Gasoline Engine; two half million gallon Triplex Pumps; three deep well pumps, etc.

Specifications and forms of tender may be seen at the office of the undersigned.

The lowest or any tender will not necessarily be accepted.

F. W. FARNCOMB,
Consulting Engineer.
London, Ont. 5-6

TENDERS

FOR THE SUPPLY OF TRACK INTERSECTIONS AND OTHER SPECIAL WORK LAYOUTS.

Separate or bulk tenders on prescribed forms will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, up to noon on **Tuesday, February 20th, 1912**, for the supply of track intersections and other special work layouts.

Specifications and forms of tender may be obtained on application to the Department of Railways and Bridges, City Engineer's Office, Toronto.

Envelopes containing tenders must be plainly marked "Tenders for Track Intersections and Other Special Work Layouts."

The tenderers shall submit with their tenders, the names of two sureties (approved by the City Treasurer), or in lieu of said sureties, the bond of a guarantee company approved of as aforesaid.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor
Chairman of the Board of Control.
City Hall, Toronto,
January 22nd, 1912. 5

Wanted

$25,000 to start a Brick and Tile business on Vancouver Island on Railway close to water. I have 127 acres 60 feet thick and no bottom yet, little or no covering of the very best shale lands than can be got. I have made all kinds of tests for common face and paving brick. All kinds of tiling and vitrified sewer pipe. Property is right in the centre of the best markets of America such as Vancouver, Victoria, Nanaimo, Prince Rubert Alberni.

Prices of bricks in those cities for the class of material this shale will make ranges from $14 to $60 per thousand.

I absolutely own this land and will make any reasonable terms with anyone wanting to go into this class of business. Company promoters need not apply.

HY. SHEPPERD,
P.O. Box 460, Nanaimo, B.C.
5

Situations Vacant

Advertisements under this heading two cents a word per insertion. Box No. ten cents extra. Minimum charge 25 cents

Draughtsman Wanted

Competent architectural draughtsman wanted for general office work. Apply stating experience to H. C. McBride, Architect, London, Ont.

Situations Wanted

Advertisements under this heading two cents a word per insertion. Box No. ten cents extra. Minimum charge 25 cents

BUILDING SUPERINTENDENT desires engagement, eight years experience; practical, thoroughly competent on plans, laying out work and handling men, used to large contracts. Apply Box 423, Contract Record, Toronto 5-6

MECHANICAL DRAUGHTSMAN — Three years' shop and seven years' experience as draughtsman and checker on hoisting and automatic machinery; technical graduate; desires steady position in shop or drawing-room. Location anywhere. Address Box 427, Contract Record, Toronto. 5

Building Superintendent

Advertiser, fourteen years experience on general work as Clerk of Works and Building Superintendent, open for engagement. Reply Box 500, Contract Record, Commercial Travellers' Building, Winnipeg, Man. 5

Residences

(Continued from page 61)

Feb. 3. Plans, etc., from John Carney, Orton, Ont. ... ...

Port Credit, Ont.

Tenders are invited for the erection of a cottage to cost $4,000, for P. Griffith. Architect, Designing & Draughting Co., 36 Toronto street, Toronto. Brick and shingle, hot air heating, mantles and tile, pine finish. To be received about Feb. 20th.

Ridgetown, Ont.

Tenders will be called for new Manse to cost $3,500, for Mount Zion Presbyterian Church. Treasurer, Thos. Craig. 2-storey, brick.

Toronto, Ont.

Excavation is done for pair residences to cost $7,800, N. side Dixon avenue, for Ford & Gracie, 123 Bay street, Toronto. Architect, J. H. Stanford, Westmorland avenue; 2½-storey, semi-detached, brick, tar and gravel roofing.

Tenders are open for erection of an apartment house to cost $20,000, 216 Seaton street, for Geo. Crompton, 80 Victoria street; 3-storey, reinforced concrete, mantles, tiles, cut stone, hardwood finish, ornamental iron, tar and gravel roofing.

Jno. Ellis, 38 Emerson avenue, will build 2 detached dwellings to cost $5,000 at 55 Dixon avenue. Architect, Owner. Brick, 2-storey, and attic.

H. W. Baldwin, 35 Whitney avenue, will build a residence to cost $5,000, St. Andrews Gardens. Architect, Geo. Briggs. Brick and stucco, 2½ storeys.

Plans are in preparation for 3 residences to cost $6,300 on Concord avenue near Bloor, for H. J. Schooley, 737 Dovercourt road. Architect, W. G. Hunt, 679 Dovercourt road, Toronto; 2-storey and attic, attached brick, stone foundation, hot air heating, electric lighting, tar and gravel roofing.

A permit has been issued for pair residences to cost $3,600, E. S. Boston ave., for J. F. Sloan, 196 King street, Toronto; architect, J. H. Stanford, 17 West avenue. Semi-detached, frame and rough cast, brick foundation, shingle roofing.

P. Coltman, 187 Robert street, will build a detached residences to cost $6,000 on Alvin avenue, near Yonge street J. Gladwin Hedges, 86 Clinton street. Brick, cement, stucco and shingle, stone foundation, shingle roofing, hot air heating, electric lighting.

Plans have been drawn for a residence to cost $3,000, for Robert Kerr, 69 Madison avenue.

A permit has been granted to erect residence to cost $3,200 for W. B. Charlton, 140 Close avenue; brick, tar and gravel roofing, hot air heating, electric lighting.

B. J. Case, 189 Western avenue, is ppreparing plans for pair dwellings to cost $6,000, Humberside avenue; 2½ storey, solid brick, semi-detached, stone foundation, tar and gravel roofing, cut stone sills, mantles and tiles.

Plans are completed for detached residence to cost $2,500, S. S. Thornton avenue, for Chas. E. Ling, 5 Galley ave., Toronto. Architect, E. R. Canton, 1552 Queen street; 2-storey, brick and stone, shingle roofing.

A permit has been granted for detached residence to cost $2,500, E. S. Medland Cres., for Alex. Thompson, 512 Pacific avenue. Shingle roofing, 2½ storeys.

Plans are prepared for 2 stores and residence to cost $9,000, E. S. Fern ave., for J. S. Sharpe, 288 Roncesvalles ave., Toronto. Architect, J. H. Galloway, 23 Toronto street. 3-storey, brick, hardwood finish, cut stone, tar and gravel roofing, mantles and tiles.

Tenders are called for apartments to cost $20,000, 4 Lamport avenue, for Mrs. W. H. Pearson, Jarvis street. Architect, J. A. Harvey, 502 Jarvis street; 2½ sty., shingle roofing, cut stone, marble, mantles and tiles, hardwood finish, telephone system, galvanized iron, plate and art glass.

A permit has been issued to erect pair residences to cost $4,200, E. S. Boston avenue, for J. F. Sloan, Esq., 196 Queen west. Architect, J. H. Stanford, 17 Westmoreland; 2-storey, brick, semi-detached, frame and rough cast.

A. B. Coleman is contemplating the erection of an apartment house to cost $1,000,000, N. side Rosedale Ravine, near Sherbourne. Architect, Prack & Perrine, Hamilton. Reinforced concrete, hardwood finish, structural steel, mantles, tiles, art stone, marble, fire-escapes, machinery, art glass, passenger elevator.

A permit has been issued to erect 3 residences to cost $5,000, 200-204 Brock avenue, for R. W. Harrison, 40 Beatty avenue; 2-storey, brick, shingle roofing.

Vancouver, B.C.

Plans are prepared for residence to cost $5,000 at 1356 13th avenue w., for Jefferson & Chapman, 934 Howe street; 7 rm., 2-storey, frame, hot water heating, modern fixtures.

Plans are completed for the erection of an apartment house to cost $10,000, on Broadway and Burns streets, for Geo. Hunter, Burns street. Architect, Hugh A. Hodgson, Carter-Colton Bldg., Vancouver.

Plans are being drawn for residence to cost $12,000, near Country Club, for Honeyman & Curtis, 821 Pender W. Plans completed about Feb. 1st when contract will be let.

Plans are being proposed for 2 residences to cost $10,000 each, Shaughnessy

Height. Architects, Honeyman & Curtiss, 821 Pender W., Vancouver. One 2-storey and basement; the other to be a bungalow.

Victoria, B.C.

Plans are prepared for residence to cost $12,000 on Topaz avenue, for H. S, Griffiths, 1006 Government street; 2-storey and basement, frame. Construction will start shortly.

Westmount, Que.

H. Upton, 227 Notre Dame street west, will build three residences on Dorchester street. Architects, Hutchison, Wood & Miller, Royal Insurance Building. Two storeys and basement, 76 x 120, pressed brick and sandstone trimmings, stone foundation, hot water heating, electric lighting, gravel roofing, hardwood interior finish, tiled vestibules and bathrooms, modern construction. Work not started. Architects will receive tenders.

CONTRACTS AWARDED

Bassano, Alta.

Fifty residences to cost $100,000 to be erected on Berkeley Heights, for C. E. Ingram & Co. Builder, McLean & Carmondy, Calgary.

Calgary, Alta.

A permit has been granted for two residences to cost $5,000 (Mission) for R. J. Burns, 811 2nd Ave. N. W., Calgary; 2-storey, 22 x 37, frame, concrete foundation, hot air heating, electric lighting, shingle roofing, hardwood interior finish. Owner is builder.

A permit has been granted for 3 residences to cost $5,000, for H. C. Miller, c/o Woodcrafts Ltd.; 2-storey, 19 x 34, frame, concrete foundation, hot air htg., electric lighting, shingle roofing. Owner is builder.

Montreal, Que.

Foundations are started on two residences to cost $15,000, Grosvenor ave., for T. Lamb, R. 12 Board of Trade Bldg. Architect, Nobbs & Hyde, 49 Beaver Hall Hill; general contractor, Wm. M. Irving, 6 Guy Blk., Montreal. Plumbing and heating, J. A. Gordon, 301 St. Antoine street N. 3-storey, 50 x 48, electric lighting, tar and gravel roofing. Roofing in charge of general contractor.

Toronto, Ont.

Contract is let for alteration to apartments, for Mr. Fred Price. Architect, David Smith, Victoria street. Plumbing, Mashinter & Co. Ventilation, E. Larter.

Contract is let for 4-suite apartments to cost $7,500, Wellesley street, near Sumach, for Mr. E. Wickett, Wellesley street. Architect, E. G. Wilson, 77 Victoria street; 2-storey, brick, concrete foundation, tar and gravel roofing. Owner is builder.

Pair dwellings to cost $4,000, for F. M. Johnston, 49 Victor avenue. Builder, R. W. McFarlane; 2-storey, brick veneer, shingle and tar roofing.

Residence to cost $3,500, Waverly rd., near Queen, for F. M. Johnson, 49 Victor avenue. Builder, R. W. McFarlane.

Business Buildings and Industrial Plants

Annapolis Royal, N.S.

Negotiations in progress to merge Valley Brick & Tile Co., L. E. Shaw, Mgr., into a larger concern to be known as Nova Scotia Clay Works, Ltd. If successful a brick plant will be constructed and will include continuous kiln, steam dryer, boiler house, machine house, smoke stack, 115 ft. high, Paroid roofing, brick making machinery, etc. Cost $50,000.

Brandon, Man.

Brown & Mitchell, hardware merchants, 819 Rosser avenue, have purchased 19 ft. adjoining present premises and intend to erect big block on the whole site.

Calgary, Alta.

Plans are being prepared for erection of a business block, Riverside, for Mr. Wiggins. Architects, Burroughs & Richards. Roughly estimated dimensions are 90 x 100.

Edmonton, Alta.

J. H. Pickard is interested in the erection of a business block to cost $250,000. Architects, Magoon & MacDonald have prepared plans. 8-storey, 53 x 197, steel framework; 1st 2 storeys granite; upper storeys glazed terra cotta, elevator, steam heating. Actual construction is not expected to start till 1913—all arrangements being made, then work will be rushed.

Mayor Armstrong is contemplating the erection of a business block to cost $40,000, Namayo avenue. Three-storeys, 42 x 100, foundations laid for additional storeys later. Construction, it is stated, will start as soon as possible.

S. H. Muttart will build stores and offices on Namayo between Clara and Isabella. Architects, Magoon & MacDonald. Five storeys, 50 x 100, brick, steel frame, passenger elevator. Construction is expected to start on or about April 1st.

Plans have been prepared for 4 or 5-storey brick block, for Armstrong Bros., on Fourth street, with steel frame, 58 x 135, pressed brick, stone trimmings, steam heating, passenger elevator and freight hoist. It is stated that tenders will be called in the near future. Cost $85,000.

O. J. Edinger is contemplating the erection of a garage to cost $15,000 on Whyte avenue; 2-storey, 33 x 132, brick with steel frame, accommodating 35 cars. Building designed by David Hardie, Edmonton.

Eureka, N.S.

J. C. MacIntosh & Co. have secured control of Nova Scotia Knitting Mills here. Further plans include increased capital, plant and equipment.

Forest, Ont.

Plans are being prepared for canning factory to cost $50,000, for Dominion Canners Ltd., Hamilton, Ont. General Manager, J. J. Nairn. New machinery will be required. Work will start in spring.

Fredericton, N.B.

Senator Jones, Bangor, Me.; A. H. Huntington, Thos. McAvity, H. W. Schofield, sec.-treas. Partington Pulp & Paper Co., all of St. John, N.B., are applying for incorporation for a pulp and paper company to be known as Consolidated Pulp & Paper Co.; capital $5,000,000. The company purpose buying the Gibson lands on the Nashwaak river where rosser and paper mills will be erected.

Granby, Que.

A site has been purchased for erection of a business building (hardware), on Cowie and Main streets, for P. Phoenix. Four storeys, 105 x 32, brick, modern fireproof construction.

Hamilton, Ont.

Brown-Boggs & Company, machinists, Victoria avenue and King William st., President, J. M. Brown, plan to erect a machine plant to cost $200,000, on Sherman avenue. Manager, W. E. Blanford. Munro & Mead, Hughson and Main streets, Hamilton, architects, will probably prepare plans.

The Otis-Fensom Elevator Company, Ltd., Traders Bank Building, Toronto, are contemplating building an extension to elevator factory on Victoria avenue North. Architects, Stewart & Witton, 2 Hughson street S., will prepare plans.

Plans are being prepared for office building to cost $35,000 on Lottridge st., for Magnet Cream Separator Company. President, A. B. Petrie. Architects, Prack & Perrine, c/o Oliver Chilled Plow Works. 2-storey, 120 x 40, reinforced concrete foundation, brick walls, steam heating, electric lighting, office fittings. Contract will be let in February. Work will start March 1st.

Kingston, Ont.

J. E. Smith is planning to erect a storage building to cost $3,500 next summer.

Lethbridge, Alta.

Plans are being prepared for business block to cost $50,000 for Pagnuelo Wine & Spirit Company. Foundations to carry four storeys to be put in. Two storeys erected at present; red granite front. Building on site to be removed early in February when excavation will start.

London, Ont.

Plans will be prepared for extension to cigar factory for The Tuckett Cigar Co. Former Gorman Eckert warehouse has been purchased from Thomson Knitting Co. Staff to be increased 150 hands and latest equipment will be installed.

The Thomson Knitting Company, 334 Clarence street, plan to remove to larger quarters as soon as possible and that a larger factory will be erected in the spring.

J. Coleman, c/o Gaste Cigar Co., and B. V. Hole are interested in the proposed erection of a cigar box factory on Ridout street. It is stated plans will be prepared at once and that a quantity of machinery will be required.

Montreal, Que.

Plans are ready for offices and stores to cost $170,000 to be erected on St. Lawrence Boulevard and Ontario, for Carl Rosenberg, 60 Sherbrooke street w. Architect, C. A. Mitchell, 58 Beaver Hall Hill. Ten storeys, reinforced concrete, cream glazed terra cotta, fireproof, concrete foundation, steam heating, gas and electric lighting, marble floors and stairs wire glass, two elevators, sprinkler system, Kalamein trim, metal door and window frames. Tenders on general contract called privately by architect.

Joseph Lamoureux, 305 St. Hubert st., is planning to convert residence into store on St. Hubert street. Builder, Lacroix & Vizeau, 491 De Montigny E., Montreal.

Plans are being prepared for stores and office building, St. Catherine St. E. and Bleury. Architect, A. Mitchell,

(Continued on page 66)

Engineers, Contractors, and City Officials of Canada

are invited to visit the International Clay Products Exposition in the Coliseum, Chicago, March 7th to 12th inclusive.

The entire Coliseum and annex will be given over to a display of clay products, ranging from porcelain art ware to brick and tile and heaviest vitrified sanitary sewer pipe.

Practical demonstrations and tests—the kind that will appeal to the man having to do with city sanitation—will be given every hour of the exposition. An instance : A complete sewer will be built under a full sized brick paved street, showing every connection and detail from the model porcelain bath room to the vitrified sanitary sewer pipe and to the main sewer. Trenchers and excavating machines, pumps to remove the surplus water—every modern method of sanitary sewer construction will be shown in actual operation.

Engineers, contractors and city officials are requested to send their addresses for programmes of addresses by eminent sanitarians and booklets regarding the exposition.

THE INTERNATIONAL CLAY PRODUCTS EXPOSITION

The Coliseum, Chicago, March 7-12, Inclusive

Business Buildings and Industial Plants

(Continued from page 64)

Beaver Hall Hill, Montreal; 10 storey, fireproof, modern building.

North Vancouver, B.C.

Vancouver Safe Works Ltd., 315 Cordova W., Vancouver, Manager, Frank G. Benson, contemplate the erection of safe works on Burrard Inlet to cost $50,000.

Ottawa, Ont.

Site purchased on Laurier avenue, clearing of which will commence at once. Construction of reinforced concrete garage will commence in the spring. Mr. F. W. Wiley, Ottawa, is interested.

Owen Sound, Ont.

A site has been purchased for a rubber tire factory for Aetna Rubber Company, Cleveland; president, E. D. C. Bayne; Mayor of Owen Sound, E. Lemon. Two storeys, brick.

Port Arthur, Ont.

A proposition has been submitted by Atikokan Iron Co. controlled by Mackenzie & Mann, Toronto, re the expansion and eerection of smelter, etc., in return for site of 400 acres at Bare Point and fixed assessment for 20 years, etc. Cost $5,000,000.

Portage La Prairie, Man.

A contract will be let at once for bank and residence to cost $20,000, Sask. Ave. and Elizabeth, for Bank of Ottawa, Ottawa, Ont; 2-storey, brick, stone foundation, electric lighting, cement work, cut stone, vaults, electrical work, plate glass, mantles. Alex. McLarty likely to get contract .

St. John, N.B.

It is understood that a site has been purchased, Duke and Canterbury streets. and that a five-storey warehouse will be erected for Ames-Holden-McCready of Montreal, boots and Shoes. W. M. Angus, local manager.

Toronto, Ont.

Tenders are open for factory and moulding shop to cost $70,000, corner Spadina and Sullivan streets, for Jas. Robertson Co. Ltd. Architect, A. R. Dennison & Stephenson, 20 King west, 5-storey and basement, structural steel, cut stone, fire-escapes, shop-fronts, machinery, boilers, sky-lights, side-walk lights, electric passenger elevator, sprinkler system. cut or Ohio blue sandstone, reinforced concrete, paving brick, Wilson rolling door shutters, Worm Gear freight elevator. A stand pipe will probably be required.

Mr. M. H. P. Blachford is contemplating the erection of stores and apartments to cost $18,000, 770 Yonge, south of Bloor. Architect, Curry & Sparling, 90 Yonge street, Toronto. 2-storey Tenders open in about three weeks.

Plans are in progress for new ovens to cost $3,000, for the Nasmith Co., 42 Duchess street. Architect, Jas. Gavin, 511A Ontario street, Toronto. Steel, brick and reinforced concrete, fire-proof construction.

Plans are completed for factory addition to cost $9,000, Gladstone avenue, for Wm. Neilson Co., Gladstone ave. Architect, Chadwick & Beckett, 18 Toronto street. Brick mill construction, composition roofing, heating plant extension heating, electric light.

Plans are completed for warehouse to cost $40,000, on Dennison avenue, for S Fremes, 62 Lombard street. Architect. L. S. Yolles, 244 Simcoe street; 3-sty., slate roofing, steam heating, electric ltg., cut stone, marble, fire-escapes, hardwood finish, plastic relief work. plate and art glass, galvanized cornice, reinforced concrete, passenger and freight elevator.

Oliver Spanner, 47 Gloucester street, is contemplating the erection of store and apartments at Bloor and Symington to cost $18,000.

A permit has been granted for warehouse to cost $3,000 on Paton road, for Can. National Carbon Co. Architect, Curry & Sparling, 90 Yonge street; brick.

Plans have been prepared for warehouse to cost $5,000, near 37 River St., for H. Salter, 37 River street; 2-storey, brick.

Excavation is done for garage to cost $20,000, Richmond street west, opposite Shephard street, for C. S. Boone, 142 Crescent road; architect, Chadwick & Beckett, 18 Toronto street; 2-storey and basement, brick, stone foundation, struc. steel, art stone, reinforced concrete footings and floors. G. S. Boone will build another garage on Richmond street W. to be occupied by Schacht Motor Car Co.

T. W. Horn, 96 King west, will remodel the block extending from 102 to 110 King west and the building in rear at 31-35 Pearl street, into modern stores and offices.

Vancouver, B.C.

Arbuthnot & Helmer, 644 6th avenue W., are considering the erection of a sash and door factory at 995 6th avenue west, to cost $3,000.

A site has been purchased for store and office building to cost $450,000, Granville and Georgia, for H. Birks & Son, jewellers; managing director, Geo. Trorey. Architects, Somervill & putnam, Pacific Building. Ten storeys, 100 x 120, steel, concrete, buff brick, terra cotta facings, tile and marble heating, elevators. Working plans being prepared. Construction expected to start in June.

Plans are ready for figuring on store and apartments to cost $160,000, Pender, Brule and Melville streets, for J. J. Banfield, 327 Seymour street, Vancouver. Architect, F. H. Perkins, 67 Hutchinson Building. Three to four storeys. 189 x 132 x 99, automatic elevator, steam heat, Kinnear wall attached radiators, red brick, buff pressed brick for quoins, terra cotta trimmings, marble entrances and treads, beamed ceilings, all interior finish painted with Berry Bros. liquid granite and flat varnishing, kitchens and baths finished with "Satinet," hall, corridor and stairway walls covered with "Lincrusta Walton," entrances to flats and dining rooms, burlap 4 ft. high and panelled, concrete basement, store fronts, fir interior finish, tar and gravel roofing, etc. Separate tenders will be taken by the architect on heating, plumbing, electric wiring and elevator.

Victoria, B.C.

Plans will be prepared for stores and apartments to cost $6,500, Oak Bay ave. and Foul Bay road, for C. Souley. Architect, L. W. Hargreaves, 12 Green Blk. Victoria. Stores on ground floor.

Windsor, Ont.

Plans are being prepared for two stores to cost $8,000, for Michael Meritsky, Woodstock, Ont. Architects, Jacques & Company, Windsor, Ont. 2-storeys, 50 x 50, brick, stone trimmings, concrete foundation, gas heating, gas and electric lighting, prepared roofing, Southern pine interior finish. Tenders received by architects after February 10th.

CONTRACTS AWARDED

Calgary, Alta.

Excavation will start shortly on the erection of a brewery to cost $100,000, for Mountain Spring Brewery Co. Conrad Knapp in charge. Machinery ordered from Chicago.

Halifax, NS.

Newspaper office building to cost $76,000. Owner, Wm. Dennis, 45 Cobourg road, Halifax, c/o Herald Publishing Company. Contractor, S. M. Brookfield & Co., 58 Granville street, Halifax. Six storeys, brick, stone, steel frame, concrete and stone foundation, steam heating, concrete floors, electric lighting, tar and gravel roofing, fire escapes, vaults, one passenger elevator; all printing machinery destroyed in recent fire.

Hamilton, Ont.

Glass factory to cost $40,000, James street north, for Diamond Flint Glass Co., James street north, Hamilton. Architects, Stewart & Witton, 2 Hughson street south, Hamilton. General contractor, H. L. Dickinson Construction Company, Pittsburg, Pa. Carpentry and brick, W. H. Cooper, 197 Emerald st., N.

Montreal, Que.

Foundations are in for hotel to cost $1,500,000, Sherbrooke street, for The Fitz-Carlton Hotel Company (Hon Lionel Guest). Architect, Warren & Wetmore, East 33rd street, New York, U.S.A. General contractor, Geo. A. Fuller Company Limited, 360 St. Catherine street, Montreal. Ten storeys, 187 x 142, reinforced concrete, stone and brick, concrete foundation, steam heating, electric light, hardwood finish, cement, marble, etc., stairs, elevators, roof garden, tiled floors, etc. Hardware, James Walker Hardware Company Limited, St James street, Montreal. Kalamein work, McFarlane & Douglas Company, Limited, Ottawa. Electric wiring, J Livingstone & Company, New York. Plastering, McNulty Bros., Montreal Elevators, the Otis-Fenson Elevator Co., St. James street, Montreal.

Toronto, Ont.

Work is in progress for factory, Richmond street E., for Jno. Underwood, 90 Richmond street; architect, Gordon & Helliwell, Confederation Life Bldg., Toronto. Masonry, W. Forbes & Son. Carpentry, W. Forbes & So Roofing and metal sash, W. E. Dill Co.

Work is in progress for warehouse t cost $14,000, for The Glidden Varni Co., Wallace avenue. Architect, Prack & Perrine, Gilkinson, Hamilton. Builder, Wickett Bros. Contracts have been sublet as follows: Steel sash, Steel an Radiation Co. Carpentry, Geo. Sparling; roofing and foundation, A. B Ormsby; glass, J. R. Robinson; plumbing, Fred Armstrong Co.

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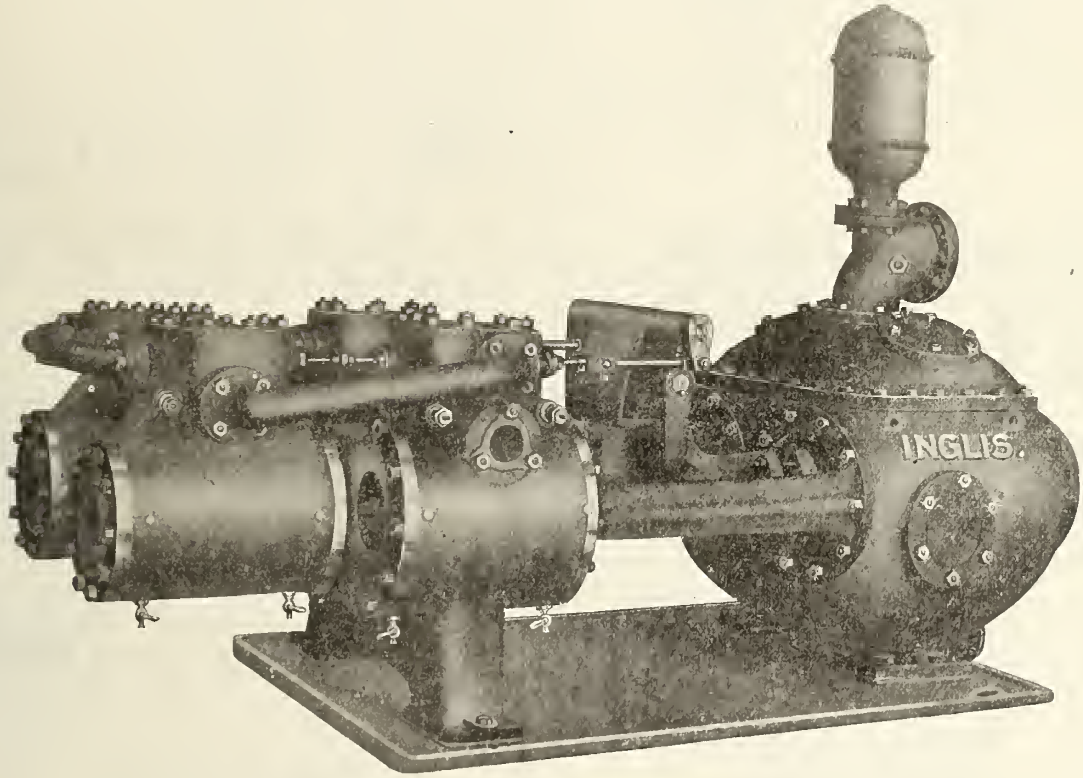

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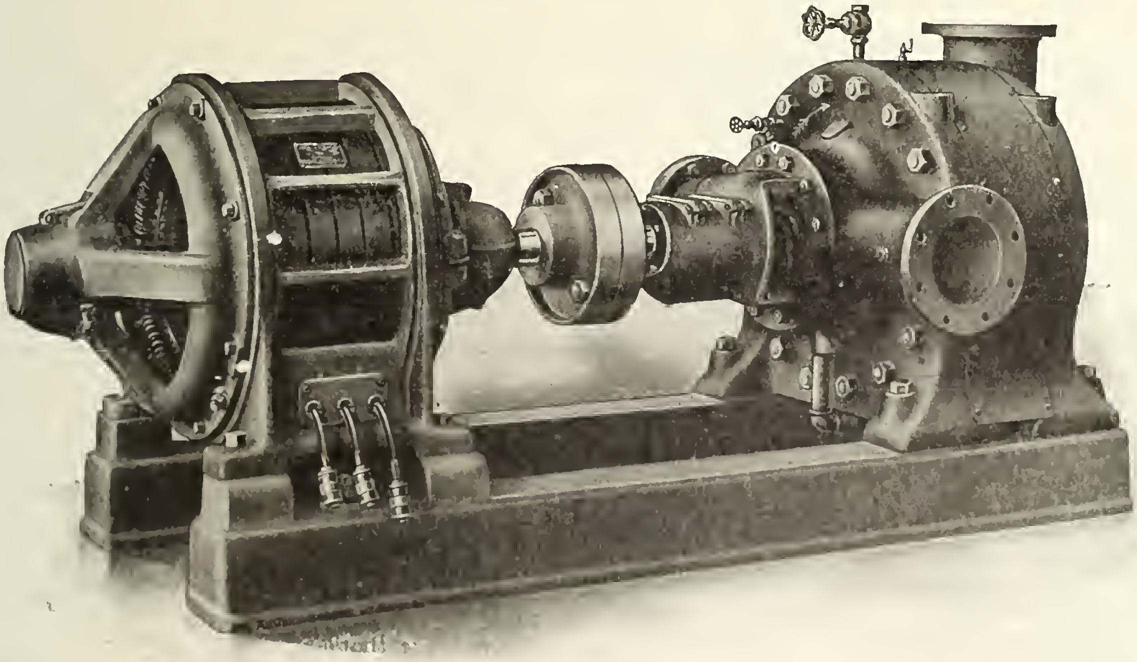

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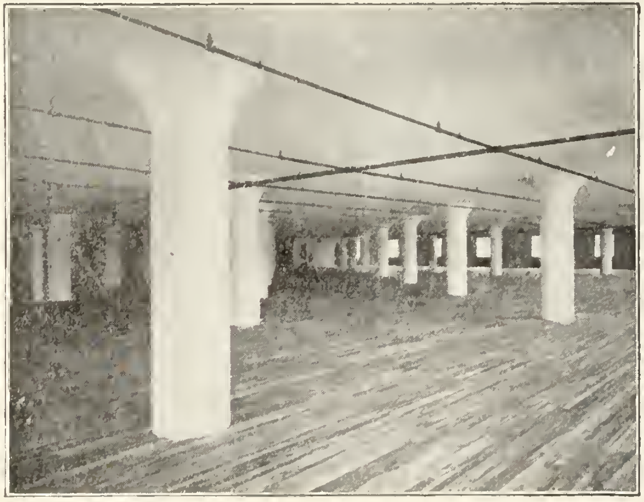

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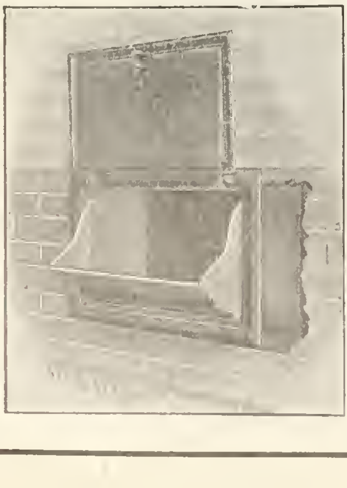

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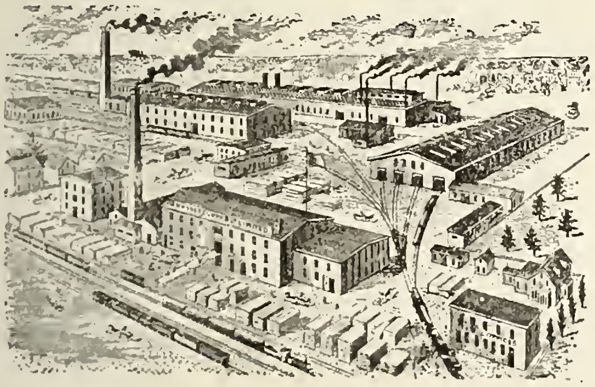

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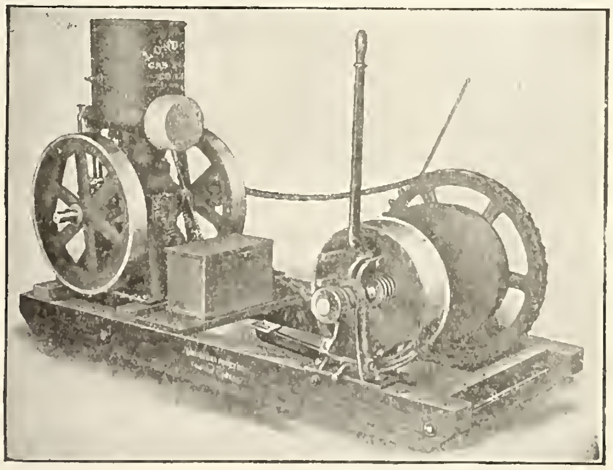

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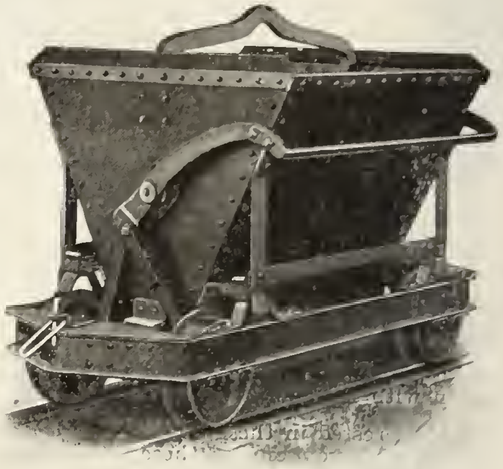

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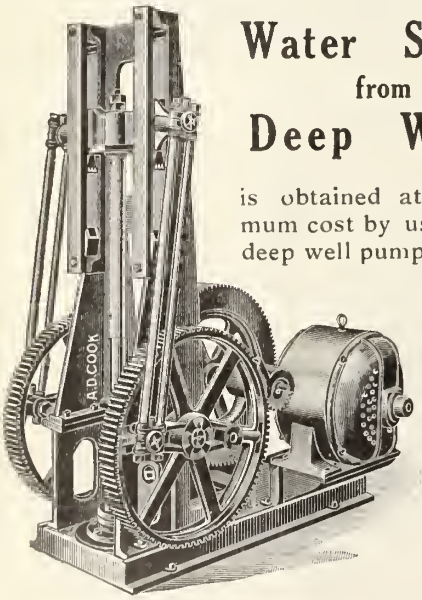

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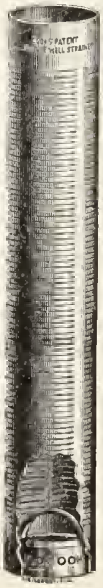

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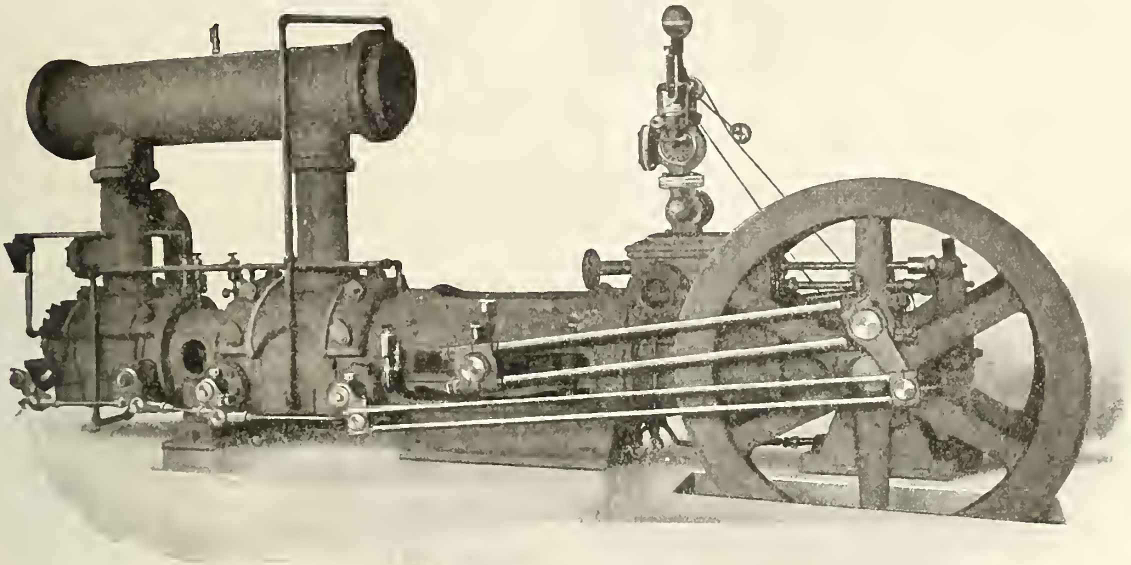

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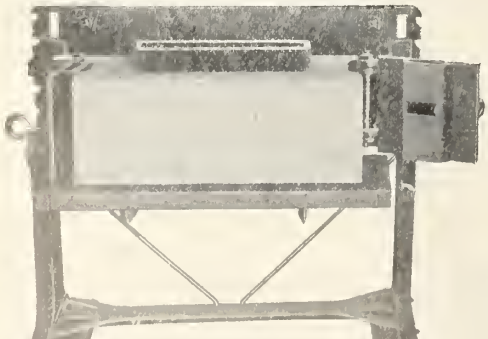

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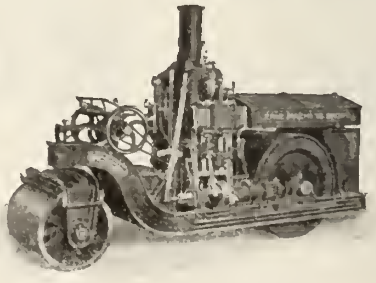

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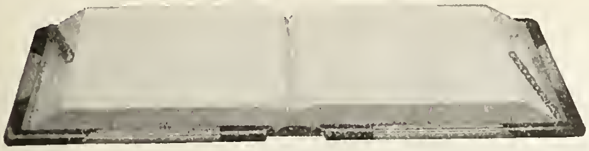

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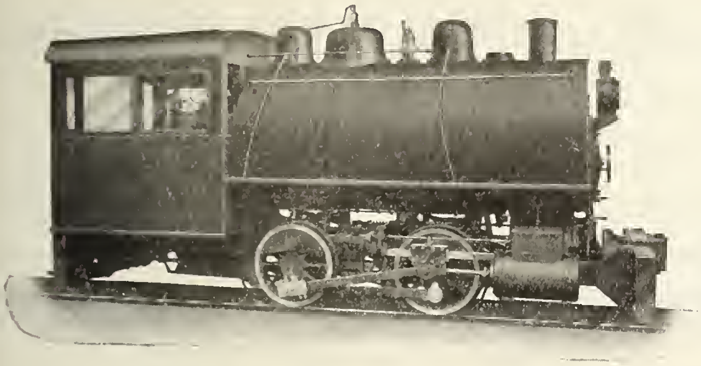

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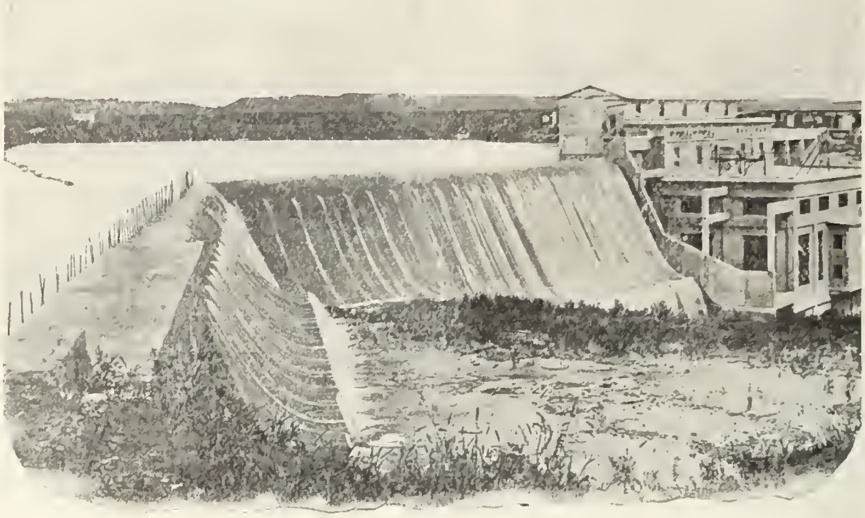
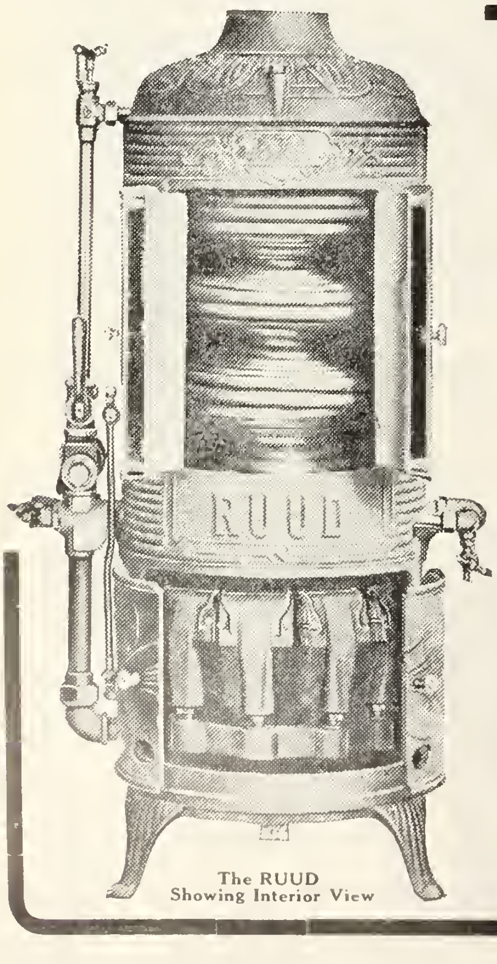


Ambursen Hydraulic Construction Co. of Canada, Limited

Concrete-Steel Dams, Bulkheads, Flumes, Transmission Lines, Power Houses and General Hydraulic Construction.

405 Dorchester Street West - - - MONTREAL



The RUUD
Showing Interior View

Thousands of Architects

Know the Value of

The "Ruud" Automatic

Instantaneous

Gas Water Heater

One installed in the cellar means hot water for everybody in the household at any time and all the time. Not only that, but all you have to do is just turn the hot water faucet. There is nothing to light or put out – no waiting for water to heat. Opening the faucet lights the gas in the RUUD and closing the faucet turns off the gas. The supply is inexhaustible, because the water is heated **as it flows.** There is a RUUD in operation at our salesroom .It will interest you if you come in and see it work. 12 and 14 Adelaide St. W., or send for representative. 700 now in use in Toronto.

The CONSUMERS' GAS COMPANY

19 Toronto Street, TORONTO

Telephone Main 1933 Main 707 Main 4142

The Mullen Combination Tar Kettle and Gravel Heater

A Money Maker for Contractors

Is on wheels and can be easily moved about. Supplies hot gravel and hot tar from the one fire.

Write us for particulars

Tide Water Iron Works
HOBOKEN, N. J., U. S. A.

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Builders' Supplies

Head Office:
510 Crown Life Building, Queen and Victoria Streets
Phones: Main 5472-5473
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- Grey Lime
- White Lime
- Hydrated Lime
- Portland Cement
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- Waterproofing Cement
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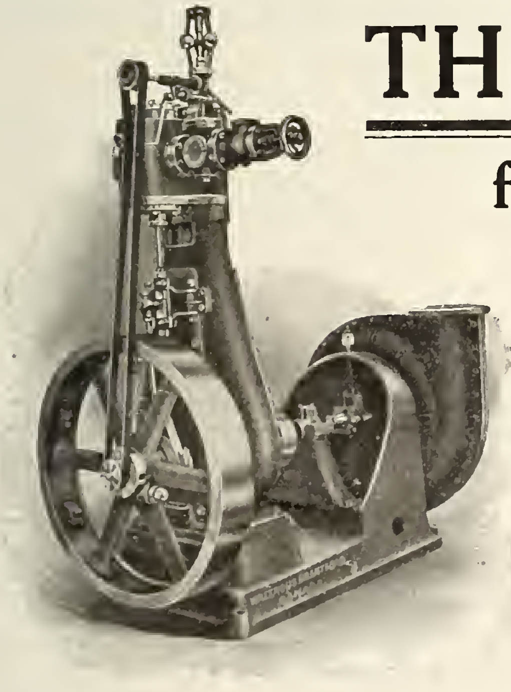
We can make immediate delivery of any of the above materials from any one of our branch yards. Would be pleased to have your order.



THE PUMP

for the General Contractor

In this pump and engine we offer a pumping outfit that for simplicity, strength and general efficiency cannot be bettered.

The pump section is our standard pump design with reversible runner, rim split shell, bronze packing gland and split base. **The engine**, direct connected to pump, is a vertical high-speed single crank type, entirely enclosed and self oiling, fitted with "Sweet" balanced and double-ported slide valves and built on duplicate part system.

Simple to install and to operate this pump unit requires small space and can be depended upon to work full shift day after day with little attention, other than occasional overhauling for cleaning and lubrication. Built in nine pump sizes, from 4-in. to 14-in. diameter discharge opening.

Write for Descriptive Bulletin No. 201

The Waterous Engine Works Co., Limited
Brantford, Canada

Note tremendous metal weight on this floor. Entire building of Alsen's Cement reinforced concrete

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
45 BROADWAY, NEW YORK

ANOTHER TEST

Put on a wall two sheets of lath, one the ordinary kind and one of Herringbone. Mix your plaster too wet and without sufficient hair. By varying your mix you will easily find a plaster which will drop badly from the back of the ordinary lath but will not drop from the Herringbone.

Herringbone Lath gives the best key

CLARENCE W. NOBLE
General Sales Agent
117 Home Life Building, Toronto
Metal Shingle and Siding Co., Manufacturers

Merriman One-Car Asphalt Plant

The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.

Many special features. Write for full particulars.

Also Asphalt Mixers
East Iron & Machine Company, Lima, O., U. S. A.

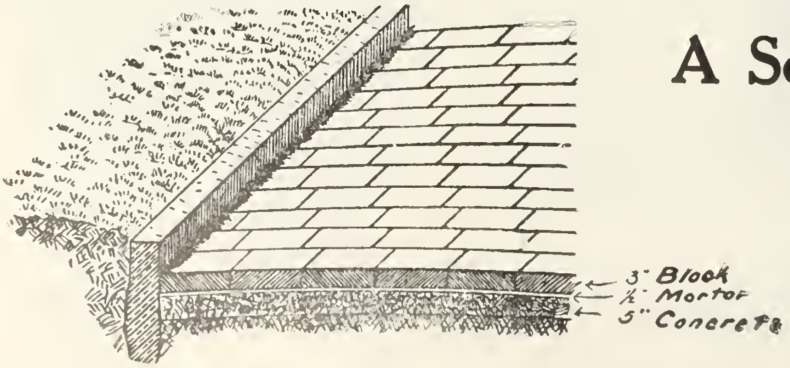
EVERYTHING YOU WANT

in a Factory Site

Water, drains, sidewalks, gas, electric power, tramways, three railways, police and fire protection and all Montreal's facilities

at

Maisonneuve, Que.



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must be

Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by
Asphalt Block Pavements
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The Ontario Asphalt Block Company, Limited - Windsor, Ont.

for Highest Efficiency, Absolute Reliability, Greatest Economy

Used by the Largest Mining Companies and Hydro-Electric Plants.
Also Extensively for Dredging, Exhaust Steam, Compressed Air, etc.

Sizes 3 to 42″ Diameter up to ¼″ in thickness
'led and securely connected with our Forged Steel Flanges or All Steel Bolted Joints.

Write for our Catalogue 5-A and prices on your requirements

'RAL PIPE WORKS MAIN OFFICE—CHICAGO
NEW YORK OFFICE—50 Church Street

A Stucco or concrete
house needs protection
with the original

BAY STATE

'ICK AND CEMENT COATING

' coating prevents discoloration or cracking from moisture and
' not destroy the pleasing texture of the concrete or stucco.
been endorsed by the National Board of Fire Underwriters
' retarder and is a perfect protection as well as a beautiful
the exteriors or interiors of residences, hotels, garages,
nd mills.
S it stands wear and washing and does not disintegrate.
' a book which tells all about it and a list of the well
'els, mills and factories on which it has been used.
' this medium.

Howland & Co., Inc.
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Canada Steel Co., Limited, Hamilton, Ont.

(Independent of all mergers)

Manufacturers of **STEEL** For Reinforcing Concrete.
Plain Rounds, Squares or Twisted Squares.
Cross Arm Braces, plain and galvanized.

ANGLES from ¾ x ¾ in. up to 2 x 2 ins.
ROUNDS and SQUARE from ⅜ in. up to 1¼ ins.

We can ship from stock

FLATS from ¾ i
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Ask us for prices—they will interest you.

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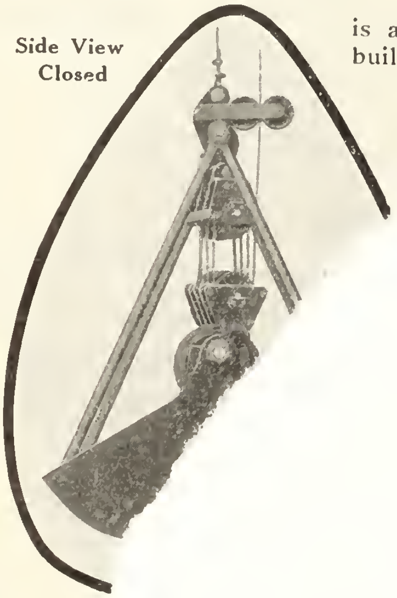

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Bigger Business

The thought of more business is uppermost in everyone's mind just now. We are all planing for bigger things—more business, lower expenses, increased profits, greater efficiency.

The season of renewed activity is at the door—greater opportunities are offering.

Where are they ?
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Both potent questions—both answered completely, accurately and on time by MacLean Daily Reports.

These reports guard against oversight and loss of opportunity—supply your travellers with live sales pointers—enable you to keep tab on all business offering throughout Canada.

May we talk it over ?

MacLean Daily Reports Limited
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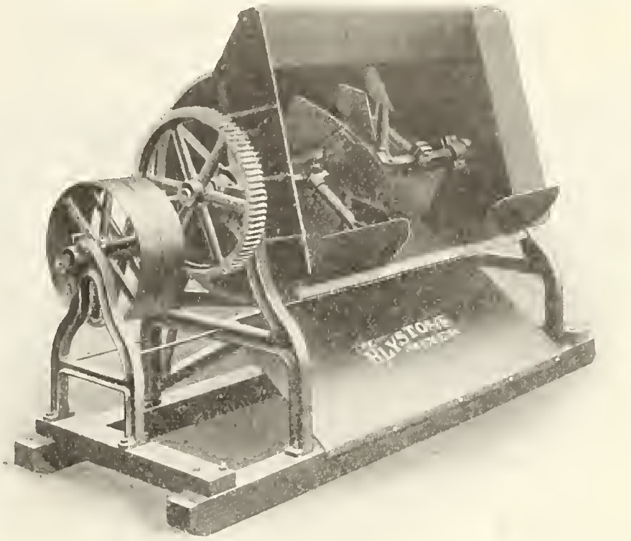


The Blystone Skid Mixer

is designed to give the highest efficiency at smallest expense. Its construction is strong and its simple design renders it easy to work and easy to clean.

Specially adapted to brick, block and tile plants. Equipped with speed reducing gear, tight and loose pulleys, and can be belted direct to power.

The above cut shows the Batch Mixer on skids for shop use—in position for discharging material.

Catalogues sent on application.

The Blystone Machinery Company
52 RAILROAD STREET
Cambridge Springs, Pa., U. S. A.

NOW IS THE TIME

To Arrange For

Next Year's Heating System:

The

Sturtevant

System

Forces the warm air just where it is wanted.

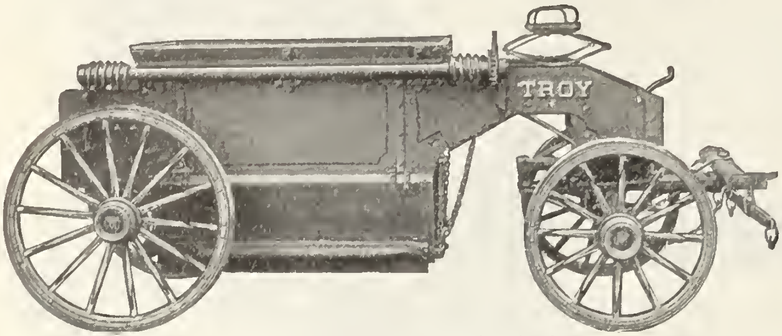
It contains no scattered steam piping to freeze or leak.

Send for Catalog No. 112 Z

General Office and Works: HYDE PARK, MASS

Designers and Builders of Heating, Ventilating, Drying and Mechanical Draft Apparatus: Fan Blowers and Exhausters: Rotary Blowers and Exhausters: Steam Engines, Electric Motors and Generating Sets: Pneumatic Separators, Fuel Economizers, Forges, Exhaust Heads, Steam Traps, Steam Turbines, etc.

Adv. No. 868



January 1st — Resolution Day

Troy Bottom Dump Wagon, New Model

Resolve to do your hauling cheaper than you did last year.

Use TROY Specials and get your costs down to rock bottom. Your teams can make more trips—the Special is lighter running. Your men can load it quicker—it's lower down. And it never can get out of order. The price is **Right.**

Get Catalog 22

The Troy Wagon Works Co.
North Market St.
TROY - OHIO

The
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Canada's Pioneer and Leading Concern in the Marble Business

They will sell you Quarry Blocks, Sawn Marble, Marble completely finished for either interior or exterior purposes, and, if necessary, they will contract to set it in place.

Samples may be seen at District Sales Offices:—

Eadie-Douglas, Ltd.	Toronto, Ont.
C. N. Barclay	Winnipeg Man.
Bosse & Banks	Quebec, Que.
General Contractors Supply Company, Ltd.	Halifax, N. S.
129 Sparks Street	Ottawa, Ont.
James Robertson Co. Ltd.	St. John, N. B.
G. R. Duncan	Fort William, Ont.
Walker & Barnes	Edmonton, Alta.
The Ritchie Contracting & Supply Co. Ltd.	Vancouver, B. C.
315 Coristine Building	Montreal, Que.

Take the Best Care of Your Horses, it will Pay You

Johnson's Reliable Veterinary Remedies

will give you better satisfaction for less money than any other preparations on the market. They are being used by most of the large horse owners throughout Canada — particularly by the Lumbermen and Railway Contractors.

The lines that are selling best are:

Johnson's Horse Liniment, No. 1 (Alcoholic)

1 gal. jugs (Imperial)	$4.50 gal.
1 lb. bottles	8.00 doz.
2 lb. bottles	15.00

Positively the best all round Horse Liniment made.

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1 gal. jugs (Imperial)	3.00 gal.
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2 lb. bottles	11.00 doz.

Johnson's Horse Colic Remedy

A sure and speedy cure for all kinds of Colic

1 gal. jugs (Imperial) 40 doses	5.00 gal.
1 lb. bottles 4 doses	8.00 doz
2 lb. bottles 8 doses	15.00 doz.

Johnson's Veterinary Healing Ointment (Gall Cure)

2 lb. tins	2.00 per tin
4 oz. tins	3.50 doz.

Johnson's Condition Powders (Concentrated)

1 lb. packages	3.60 doz.

A full supply of all drugs and patent medicines at lowest wholesale prices.

Have you ever used for your men

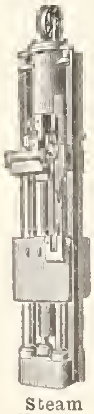
Johnson's Mosquito Oil 1.75 doz., 1800 per gross
It positively does the trick

Our prices are lower than those of all other manufacturers. Letter orders receive prompt attention.

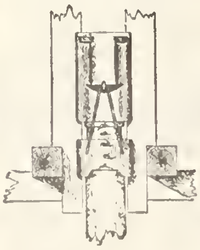
A. H. Johnson, Wholesale Druggist, Collingwood, Ont.

PILE DRIVERS

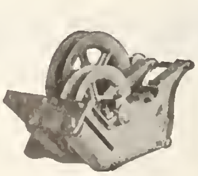
VULCAN IRON WORKS CHICAGO ILL., U.S.A.
Station D



Steam Hammer



Casgrain Pile Cap



Perfect Head Block

Use Enameled Brick

"BUILD ONCE

AND

BUILD RIGHT"

Address all inquiries to our Head Office,

1182 Broadway, New York City

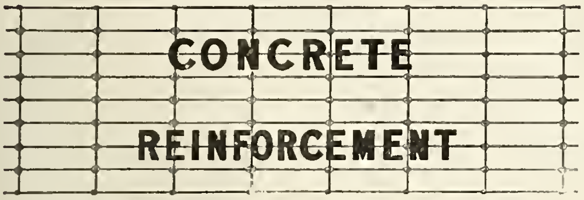
AMERICAN ENAMELED BRICK & TILE CO.

1 1-2 Times as Strong as Bar

Page Flat Wire Reinforcement

solves the problem of quick laying, contouring, proper tamping, perfect setting of concrete spans, and the easy preparation of column reinforcement.

Sheets are in flat units of any length. Bonding area is 27.7528 lineal inches per sq. inch of section, against 3.5343 and 4.0 ins. for round and square bar.



Tensile strength is **one and a half** that of steel bar, allowing equal strength with two-thirds the weight of reinforcing, and nearly **six** times the bonding area for increased safety, compared with bar steel.

Write us about this new and convenient form of reinforcement. It saves labor. Betters construction. Insures perfect bonding. Sample free.

The Page Wire Fence Company
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BRANCHES:
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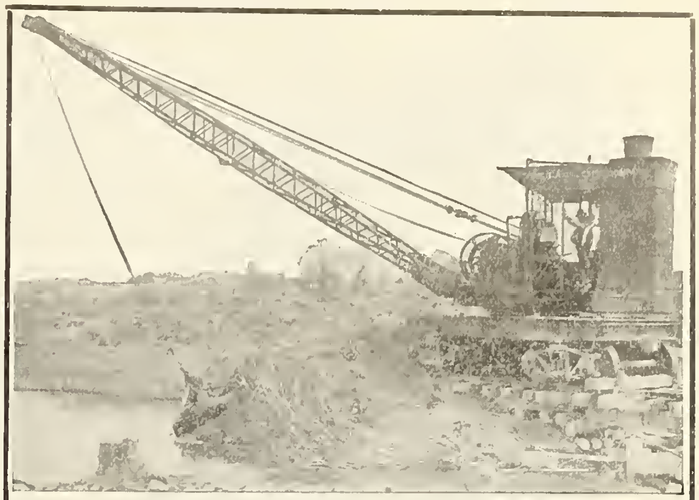
Montreal, 505-17 Notre Dame St. West
St. John, N. B., 37 Dock St.



BROWNHOIST

Locomotive Cranes on Construction Work

The one shown here is working on the New York State Barge Canal equipped with a scraper bucket. These cranes are used from the beginning to the end of a construction job. They do the excavating with any style bucket; drive the piling; deposit all concrete both to elevated forms and to trenches; handle the sand, gravel, crushed stone, heavy timbers and steel sections; and switch the cars.

These different operations are shown in our new illustrated catalog. Write for it to-day. It is free.

The Brown Hoisting Machinery Co.
CLEVELAND, OHIO

"NORWETA"

stands for the product of

The Northwestern Terra Cotta Company
Chicago

It means the best Architectural Terra Cotta ever made.

Canadian Agents:
S. W. Black, Toronto
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British Made

Terra Cotta

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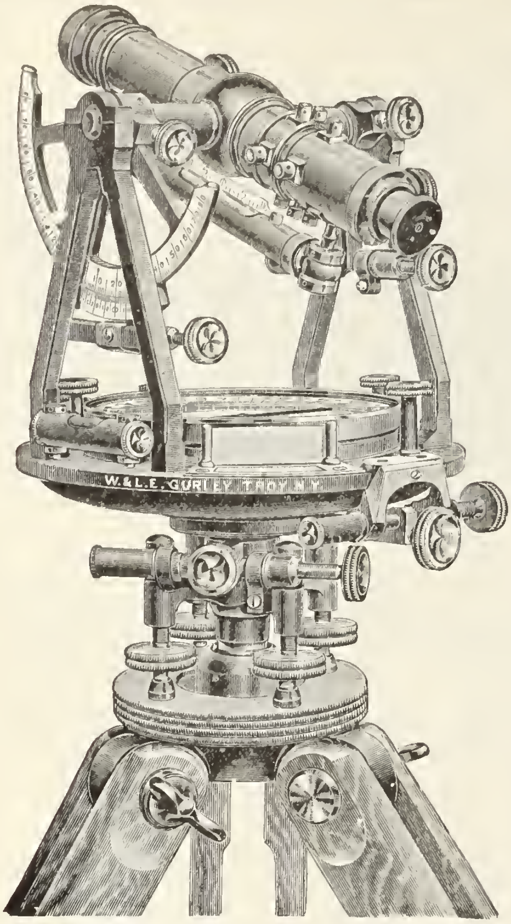
King Brothers, Limited
STOURBRIDGE, ENGLAND
Proprietors of Stourbridge Clays

REDS--BUFF--STONE--GREY

and all Colors, Glazed and Unglazed

Estimates on application by

The Toronto Plate Glass Importing Co
Tel. M. 3877 Don Roadway, Toronto Limited



1845 1912

W. & L. E. Gurley

TROY, N. Y.

Largest Manufacturers in America of

Field Instruments

for Civil, Mining and Hydraulic Engineers and Land Surveyors

Transits
Y Levels
Compasses
Plane Tables

Current Meters
Levelling Rods
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Also Makers of

Physical and Scientific Laboratory Apparatus
Standard Weights and Measures
Accurate Mercurial Thermometers

Branch Factory: Manufacturers Exchange Building. Seattle, Wash.

Latest edition of Gurley's Manual sent on Application.

"Consol" Transits and Levels

MADE IN CANADA

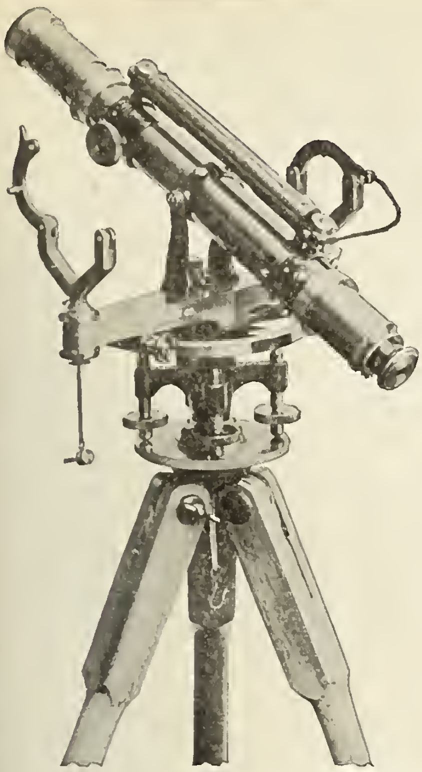
The experience of twenty years in the construction of Optical Instruments, demanding accuracy and precision, combined with the best manufacturing facilities on the Continent, enable us to place in the hands of Canadian Engineers and Contractors the finest line of instruments at a less price than is possible to importers. Transits, Builders and Architects' Levels and a full line of accessories are always available, or made to special order.

Our instruments are made entirely in our own factory and are specially designed to meet the requirements of Canadian conditions.

A skilled staff enables us to execute any kind of repairs promptly and satisfactorily.

Consolidated Optical Company Limited

400 Richmond Street West, Toronto



Convertible Architects' Level - $58.00

A point about this level of great interest to architects and builders is this—A patent arrangement enables the operator to take ***vertical sight*** to the extent of 45 degrees in either direction, and also ***horizontal angles*** between two points not in the same plane. This is an additional feature that will be found extremely useful. The instrument is constructed with an adjustable horizontal bearing, making it rigid and accurate and preventing the telescope from overbalancing. This is a distinct improvement on other instruments of this kind. Price $58.00.

OPTICAL DEPARTMENT, Second Floor, Albert St.

Call and see our stock of instruments for Architects, Surveyors, Engineers, etc.

THE T. EATON CO LIMITED
TORONTO CANADA

No. 22

Reconnoissance Transit

The L. Beckmann Co.

Manufacturers of Up-to-Date Surveyors, Engineers, Contractors Instruments

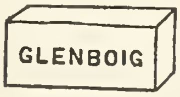
Send for our Catalogue

TOLEDO, OHIO Instrument Makers for 37 years **U. S. A.**

Do You Handle

FireBrick?

The undisputed supremacy of GLENBOIG FIRE-BRICKS make them the easiest to sell. There is a big demand for them.



Every Glenboig Brick bears the brand

"Glenboig Bricks" have stood the test of extreme heat without cracking; quick changes of temperature and without expanding or contracting.

GET OUR LITERATURE

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Alexander Gibb

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Sand and Gravel

Lime
Cement
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Fire Brick
Sewer Pipe
Weeping Tile

Our prices are right and our service good.

Britnell & Co., Limited
C.P.R. Crossing, Yonge St., North Toronto
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Builders' and Contractors' Supplies

Portland Cement, Lafarge Cement, Gravel, Sand, Rubble, Imported and Canadian Pressed Brick for front work and fireplaces.

CRUSHED STONE—Dimension and Coursing Stone, Lime
FIRE BRICK **IVORY CEMENT PLASTER**

—YARDS—
75 Brock Ave., Jarvis Street Wharf,
Avenue Rd. & C. P. R., 355 Eastern Ave.

The Contractors' Supply Co., Limited
Manning Chambers, Toronto Tel. M. 6859

Western Canada Provides a Rich Market

for building, construction and engineering supplies of all kinds. The WESTERN CANADA CONTRACTOR is the only publication west of the Great Lakes devoted to the interests of architects, engineers, contractors builders, etc.

For rates and other particulars, write

Western Canada Contractor
Commercial Travellers Building - Winnipeg

CRUSHED

All Sizes

STONE

¶ For Roadways and Sidewalks also specially adapted for

Reinforced
Concrete
Construction

¶ Our arrangement with C. P. R. to have our stone brought to Toronto DAILY by SPECIAL TRAIN makes our DELIVERIES promptest possible.

Phone Main 5377 or Write

Christie, Henderson & Co.
Limited
Head Office: **34 Yonge Street, TORONTO**

SEE

SMYTH & RYAN

for quotations on
Lime, Stone, Cement, Sewer Pipe, Weeping Tile, Mortar Colors, Plaster, &c.

Toronto Agents for
OWEN SOUND CRUSHED STONE
Deliveries G. T. R. and C. P. R.

Head Office, 1327 Bloor Street West
Phones, June. 828,829.
Branch Yards, 53 Merton Street
Phone, North 4751 G.T.R. Belt Line
Night and Sunday calls, Phone, Parkdale, 2198.

We deliver to any point all grades

SCREENED SAND AND GRAVEL

York Sand and Gravel Co.
Tel. Beach 233 **EAST TORONTO**

Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per B
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches........	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.50	$ 6.75	$ 5.25
40 u. i.	4.25	3.75	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts —Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

BUILDING TILES

(Installed in Toronto)

Floor Tile—Ceramic, any color, ¾-inch square, 1-inch hex., and 3-16-inch round, 55 cents per square foot up.

Floor Tile—½-inch square, 65 cents.

Wall Tile—Rock faced, sizes 6x2 inch, 2x2 inch; colors, buff, grey, granite, red granite, 55 cents per square foot.

Viterous Tile—All sizes, according to color, 55 to 65 cents.

Glazed—White, 6 x 3 inches, 55 cents per square foot.

Matt—Dull finish colors, first, 70 cents.

Capping Coves and Corners, special quotations to suit requirements.

Opalite Tile—3-16 inch No. 1 standard size, 6 x 3 inches, 6 x 2 inches, 60 cents.

White glass, installed, 6 x 3 inches, 30 cents.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 65 per cent.

High grade compression work, 65 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 per cent.

No. 4 compression bath cock ....net $1.65

No. 4½ Fuller's ....net 2.25

Square head brass cocks, 65; iron, 65 per cent.

Heating Apparatus

Hot water boilers, 50 and 10 per cent.; hot water radiators, 50 and 10 per cent.; steam radiators, 50, 10 and 2½ per cent.; wall radiators, 50 and 10 per cent.; specials, such as angles, curves, etc., 25 per cent.

Boilers—Galvanized Iron Range

30-gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

(per 100 ft.)	Black		Galvanized
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.03	⅜ inch	2.86
½ inch	2.63	½ inch	3.48
¾ inch	3.05	¾ inch	4.28
1 inch	4.37	1 inch	6.02
1¼ inch	5.96	1¼ inch	8.21
1½ inch	7.16	1½ inch	9.86
2 inch	9.18	2 inch	12.78
2½ inch	16.10	2½ inch	21.85
3 inch	21.14	3 inch	28.69
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

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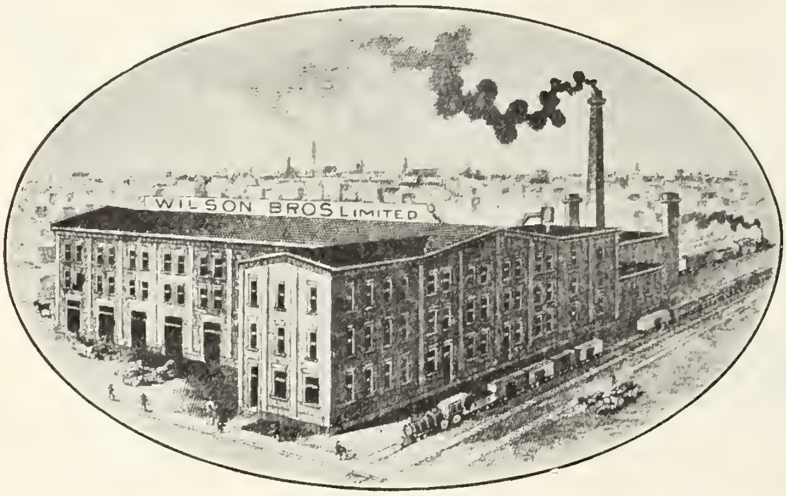

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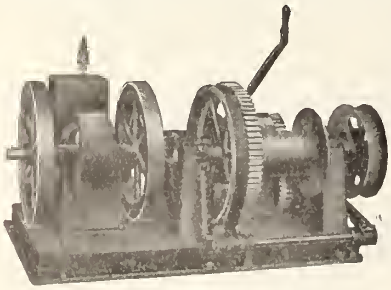

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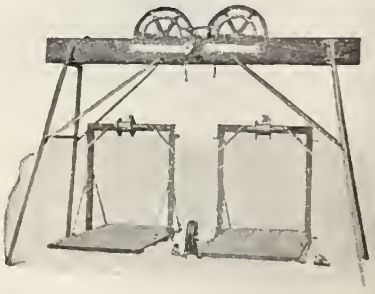

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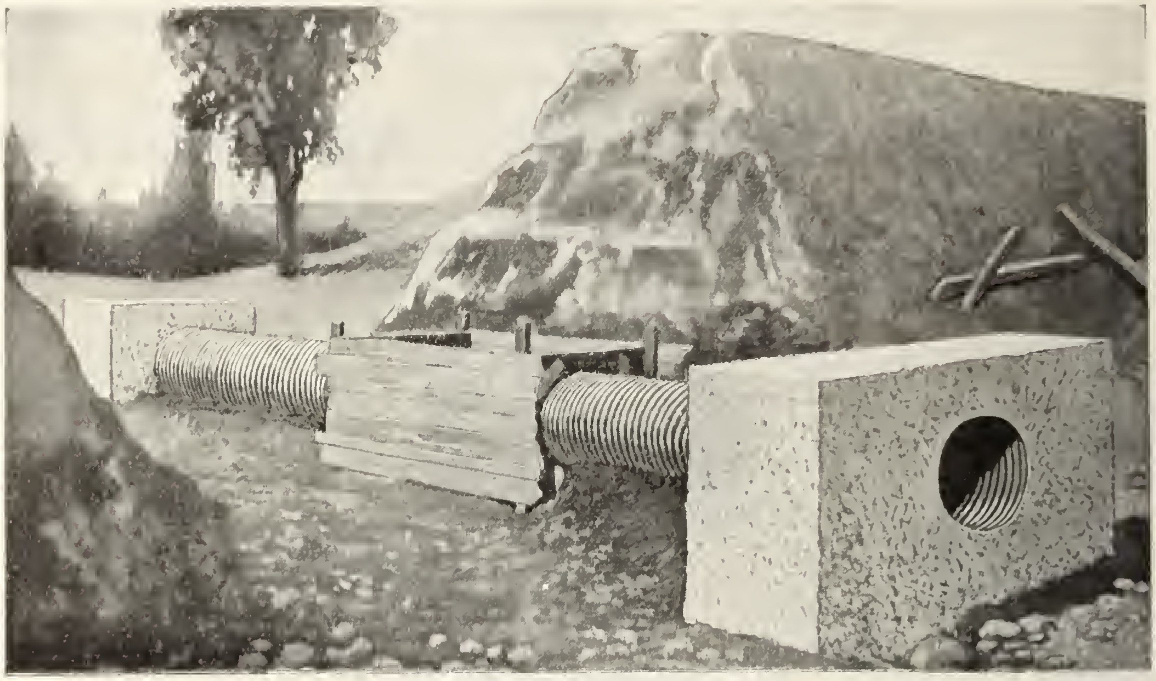

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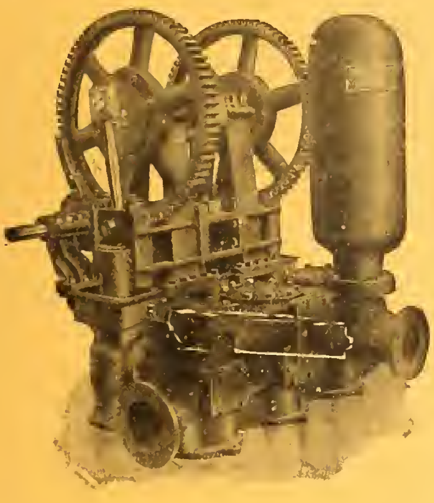

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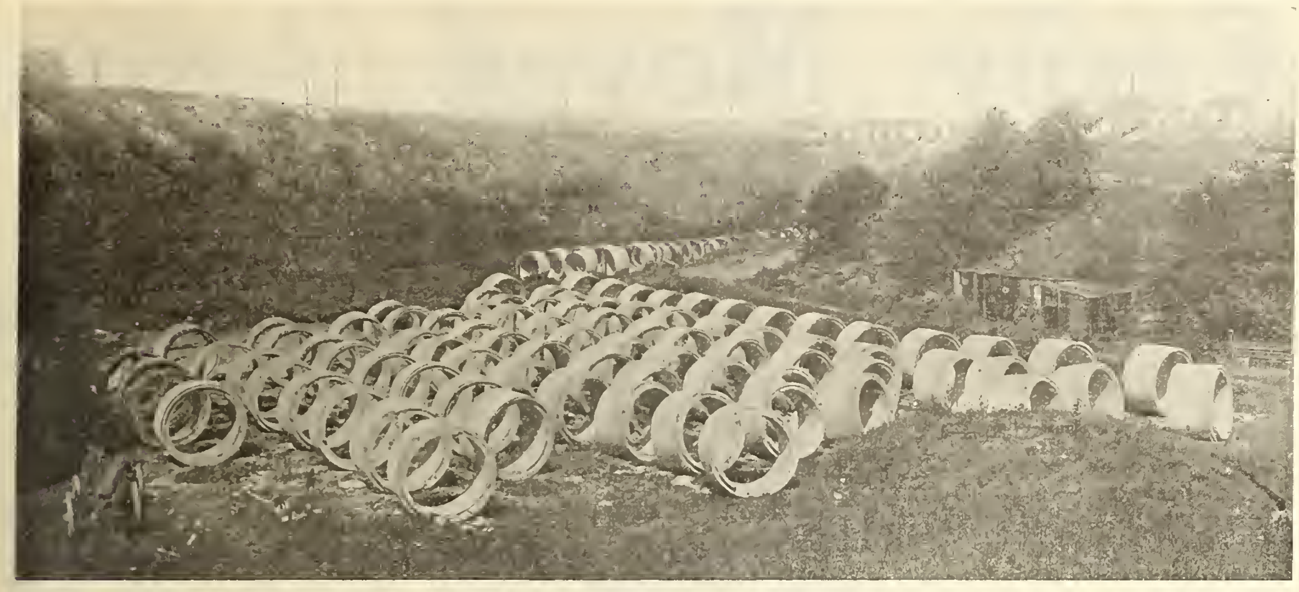

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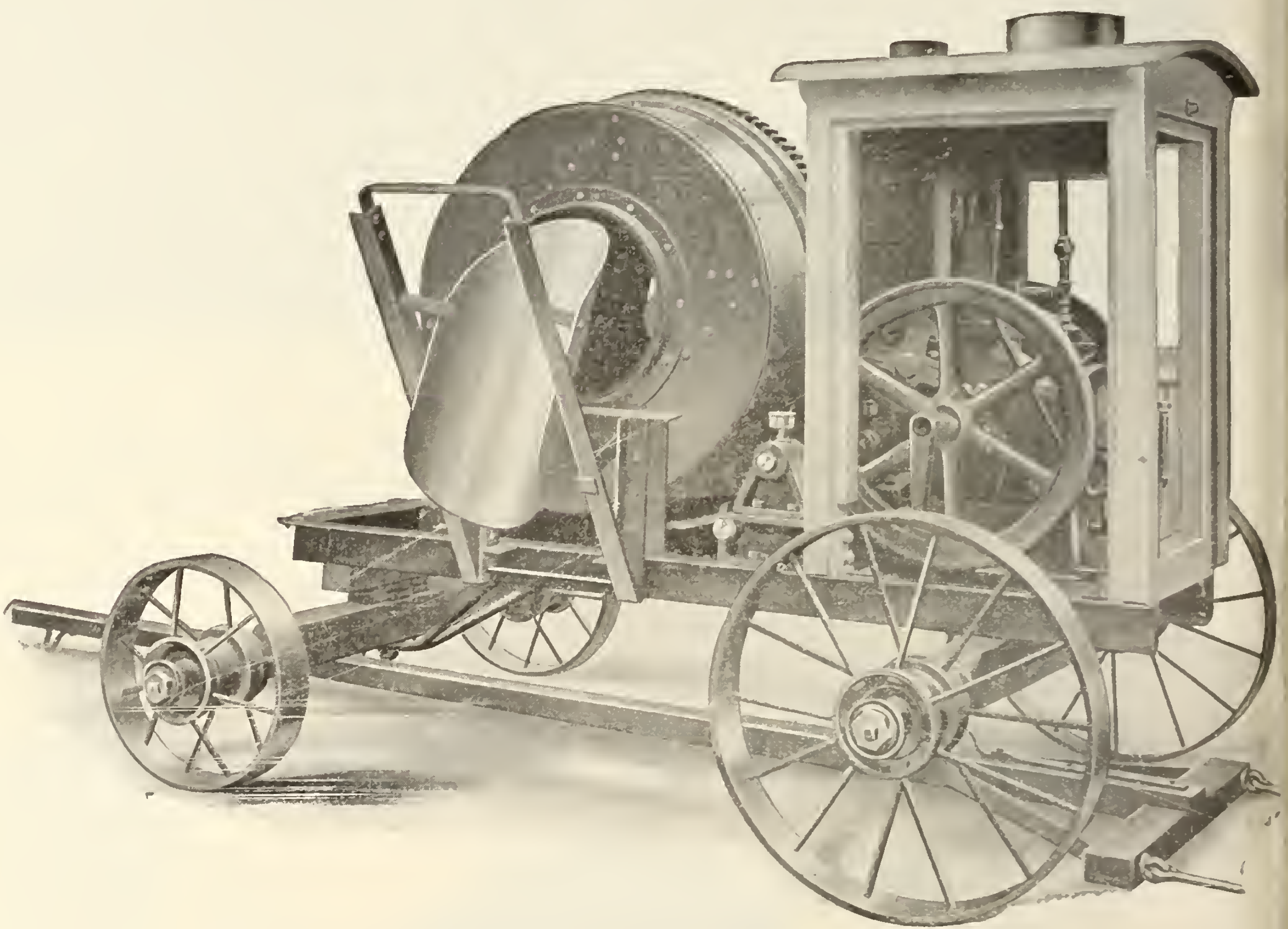

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No. O 3 cu. ft. per batch. Weight 2400 pounds.
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For Small Jobs

Or where you have a lot of moving to do, or where it is hard to get a big mixer into, we recommend our

Chicago Concrete Mixer

We are making these machines in Montreal and can oversee their construction.

We recommend them as the most satisfactory small, power mixers that we know of for doing the odd jobs where a capacity of 35 to 50 or 60 to 75 cubic yards per day is all that is required. We equip them for gasoline, steam or electric power.

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Get the Catalog of this famous M-C *"Rail Track"* Concrete Mixer.

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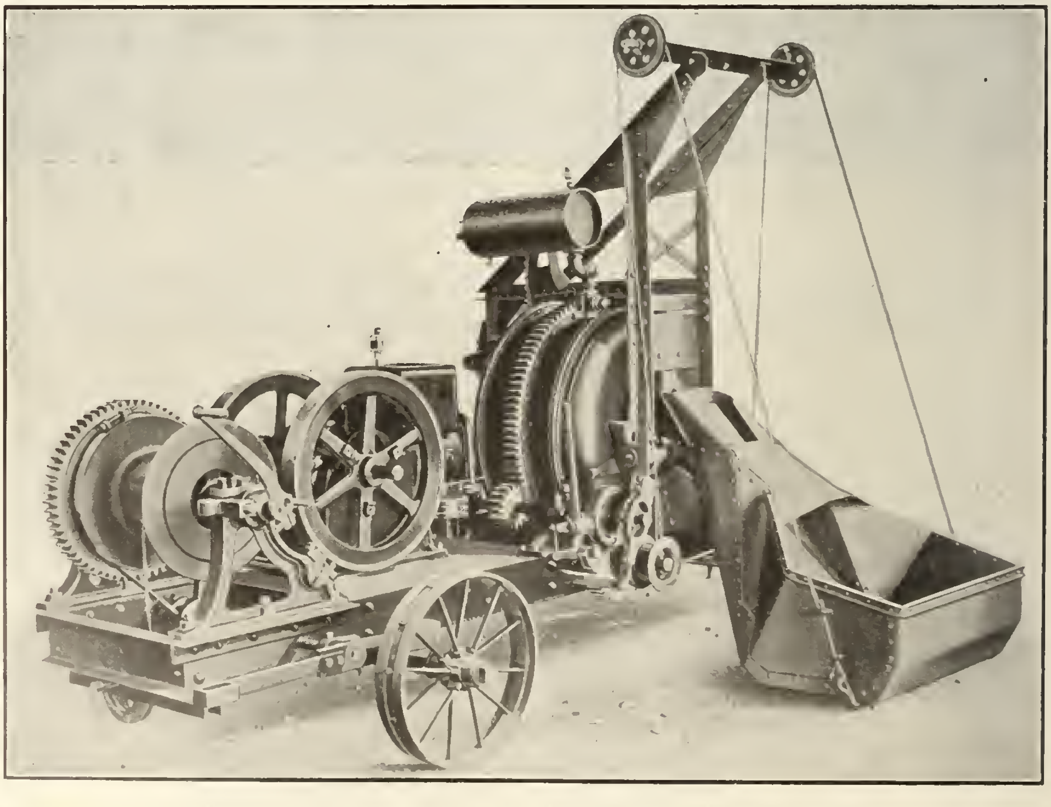
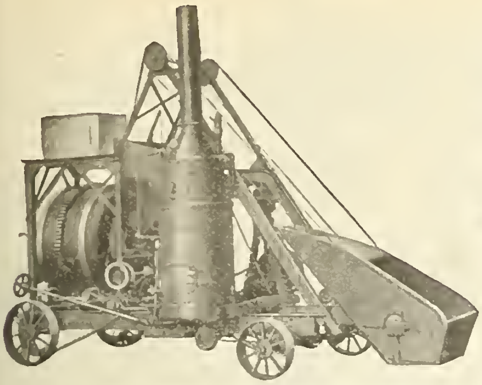
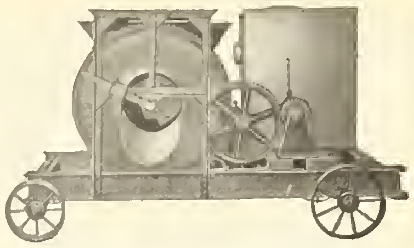


M-C Rail Track Mixer combined with Contractors Hoist. Gasoline Motor Driven.


London Paving Machine with front loader

London Concrete Machinery is built up to a standard.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We are saving the Contractor money in the COST of MACHINE, COST of OPERATING, COST of MAINTENANCE, everything made in our own shops. We sell direct to the contractor.

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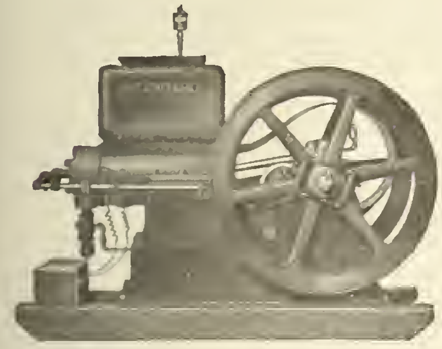
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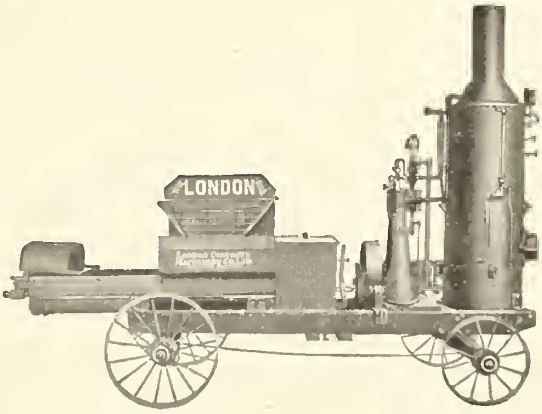

London Automatic Batch Mixer No. 2

London Concrete Machinery Co. Limited

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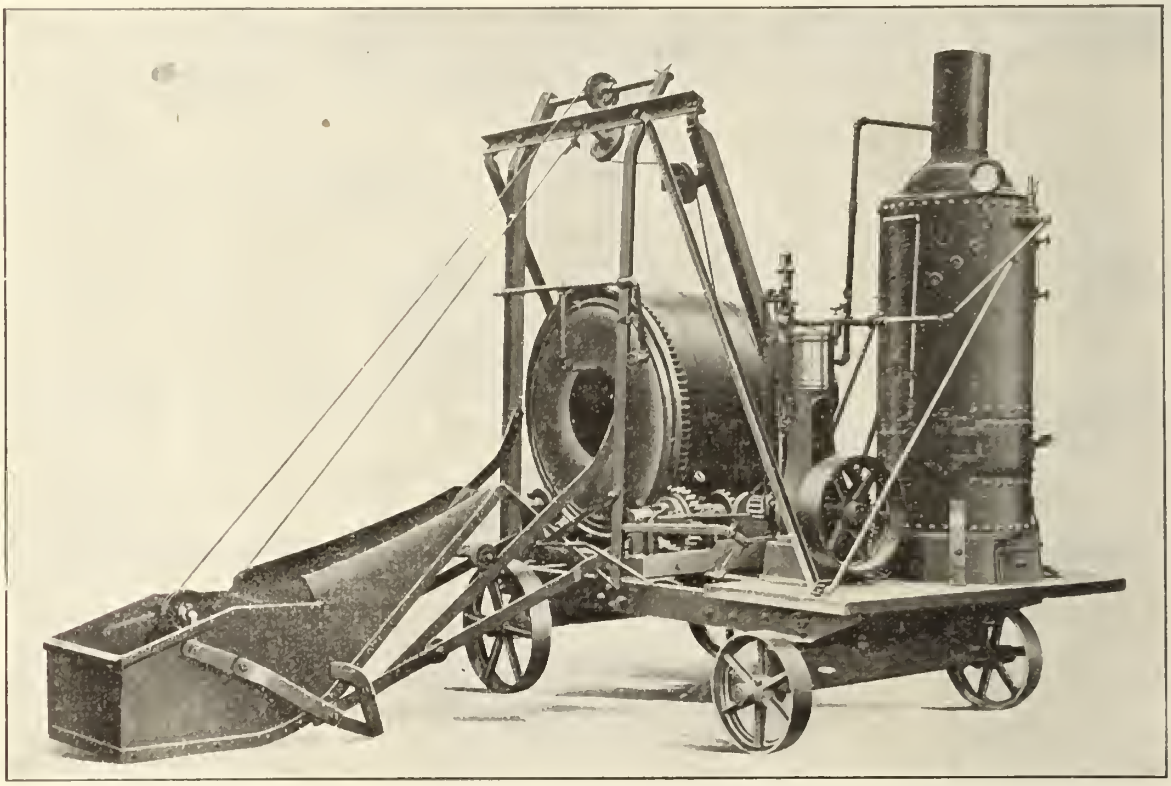
It will mean a "Wettlaufer Heartshape" in the end---Why not now?



The purchase of a reliable mixer of recognized make at the outset of a contract will save you money and time all along the line.

The present Wettlaufer Heartshape Mixer is the ultimate result of many years' experience, untiring experiment and hard practical work. Experience not only in the construction of the mixer but also in its operation.

We have taken contracts for all kinds of cement work and we know just what a mixer should do.

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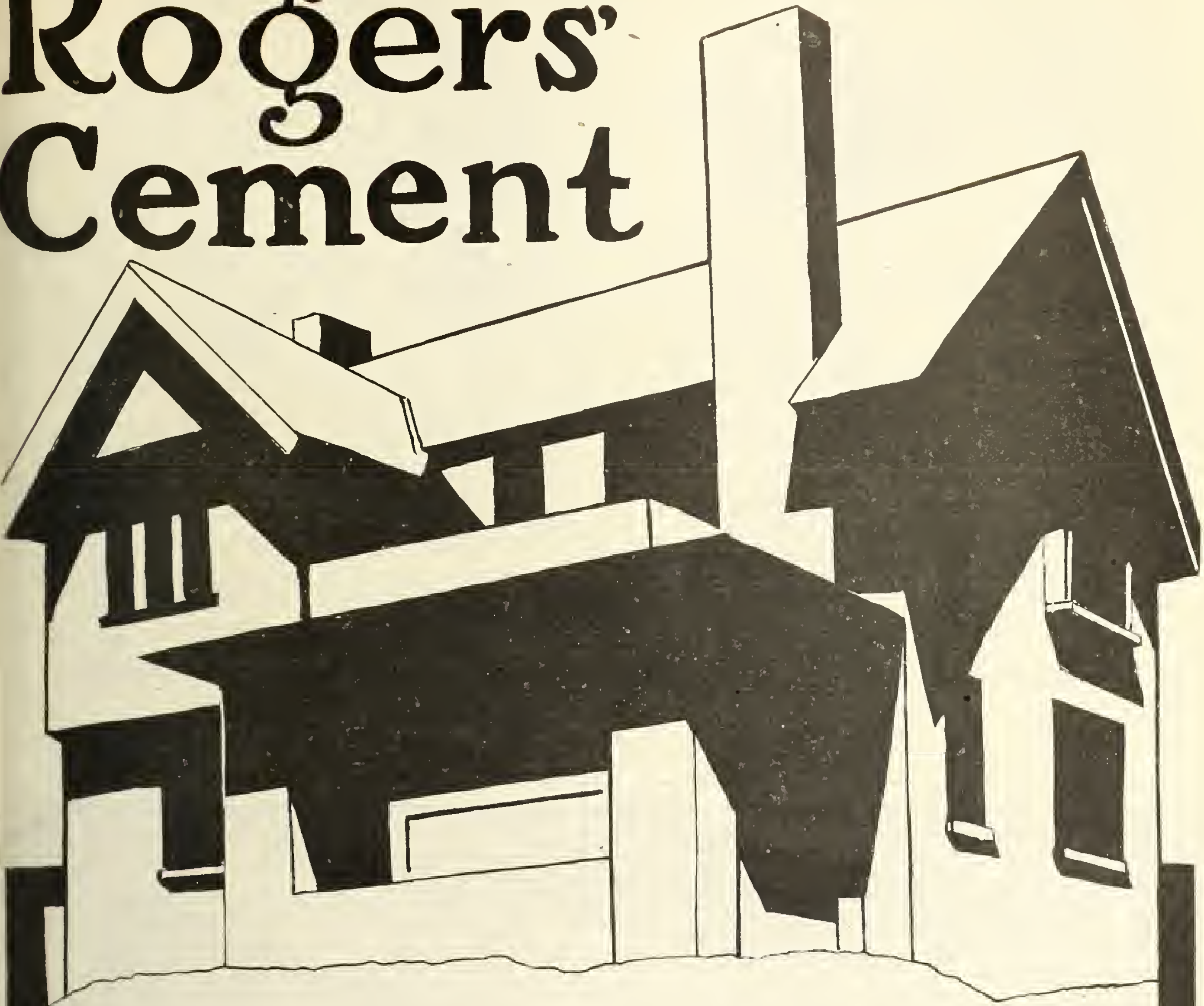

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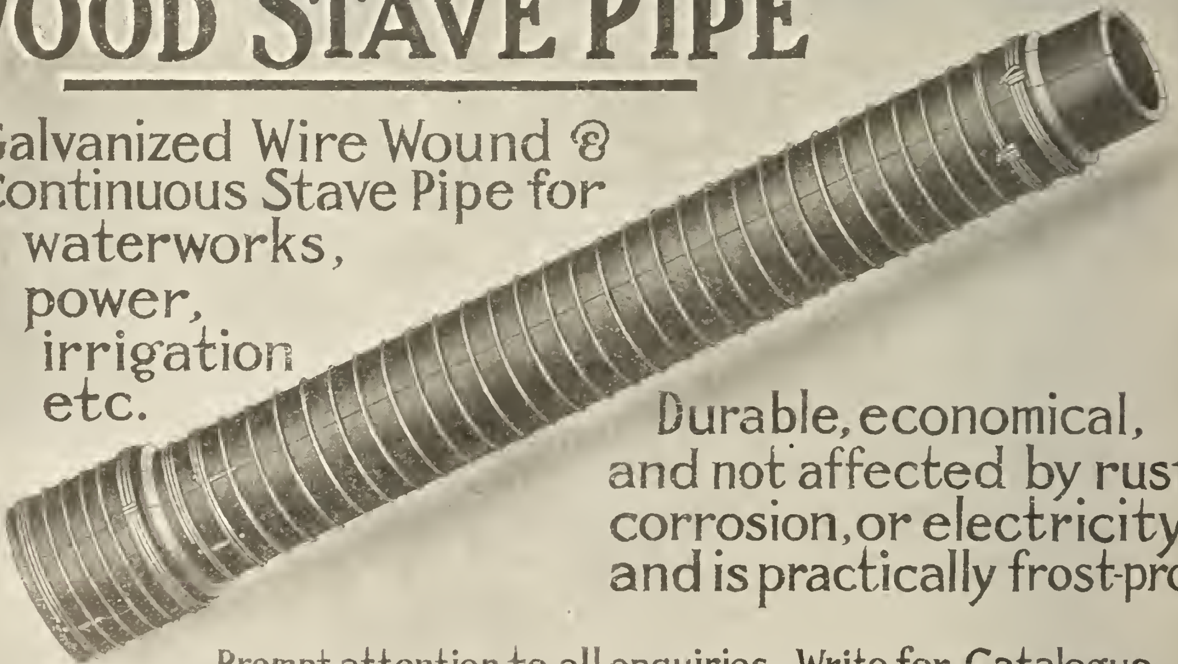

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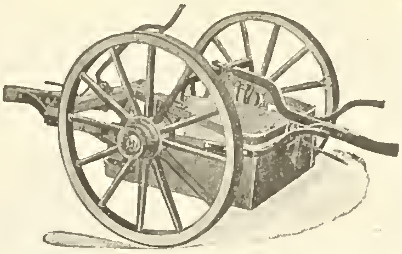

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The reason is a life-time's experience in actual contract work **combined with** an extensive manufacturing experience and every machine has been perfected after years of the most rigid tests,

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Get our complete catalogue of earth and stone handling machinery.

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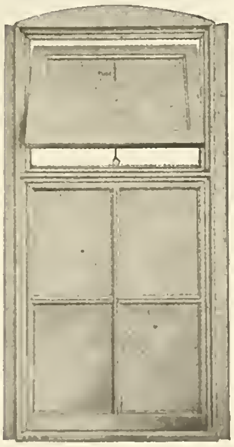

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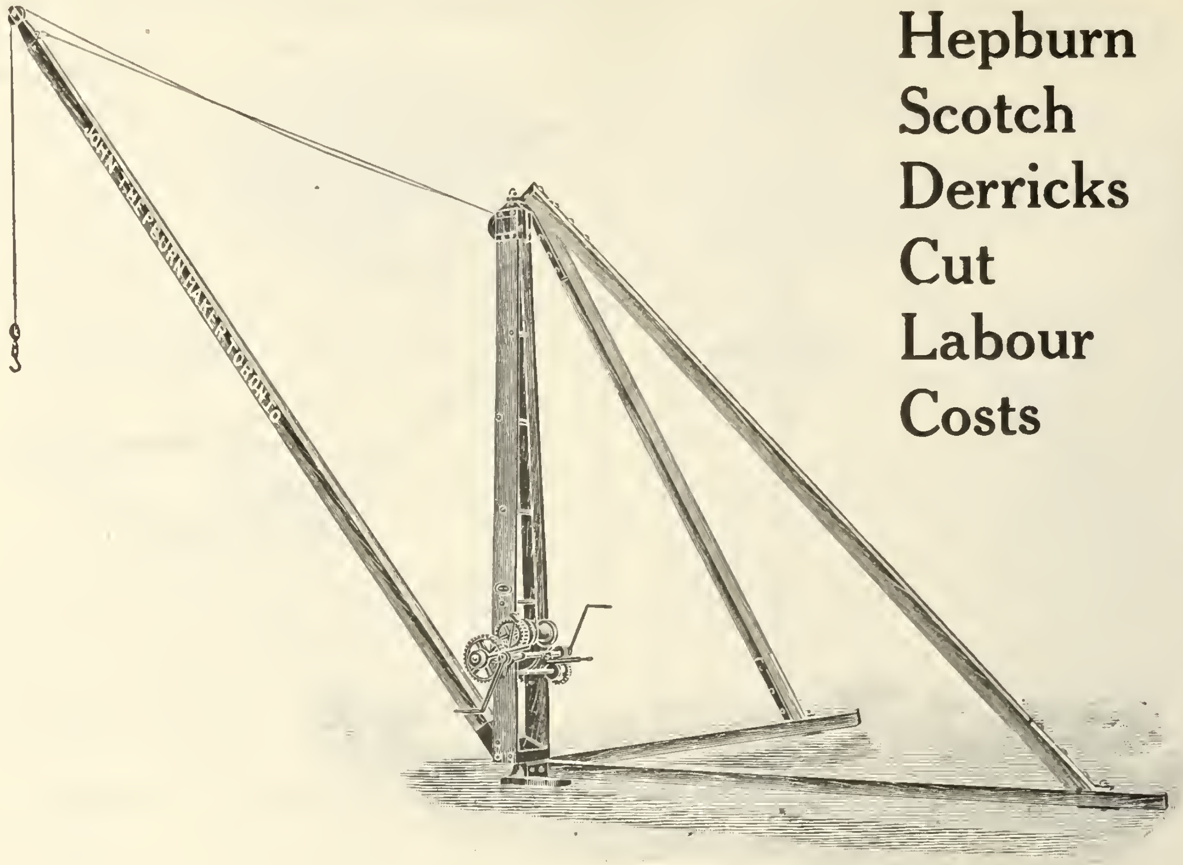
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¶ From first to last Hepburn Derricks are Hepburn-made. We **know** every part is **right** before it goes in.

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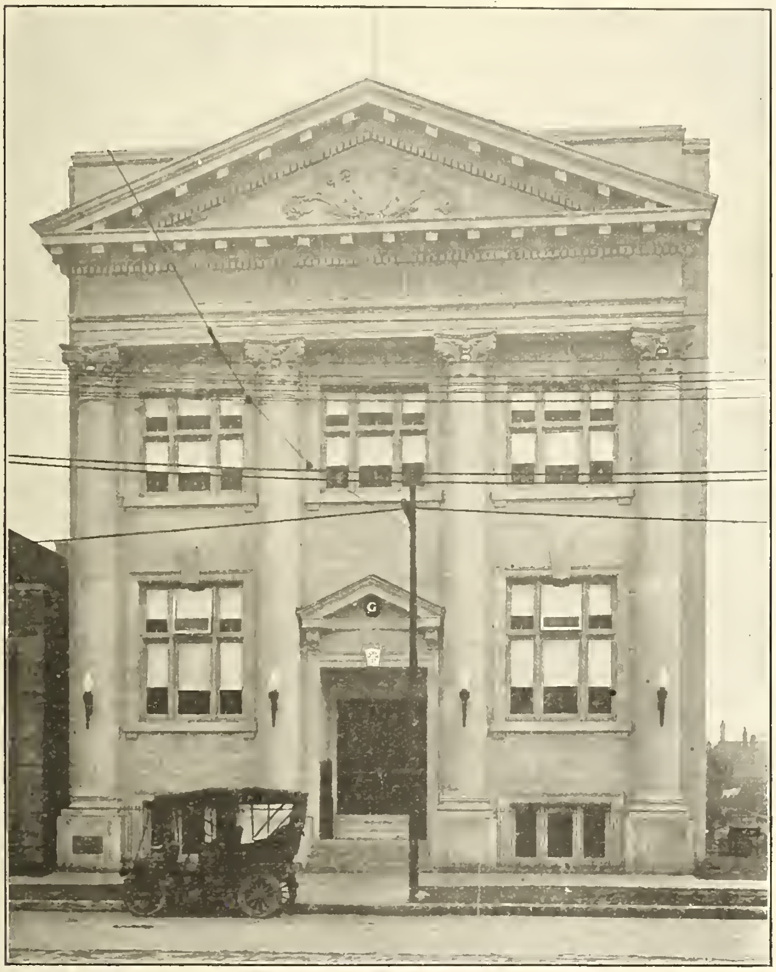

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Guarantee Company of North America 92
Gurley, W. & L. E. 84

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Hamilton Machinery Co., Ltd. 26
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Hepburn, John T. 14
Hobbs Manufacturing Co., Ltd. .....
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Inglis Company, John 67
International Marine Signal Co., Ltd. 29

Jamieson Lime Company 81
Jenckes' Machine Company, Ltd. 2
Johnston, A. H. .....
Johnston & Chapman Company .....

Kennedy, James C. 92
Kerr Engine Co., Ltd. .....
Koehring Machine Co. 17

Laurentian Granite Co., Ltd. 92
Lea, R. S. 92
Leach Concrete Company 99
Leonard & Sons, E. 75
London Concrete Machinery Co., Ltd. 9
London Gas Power Co., Ltd. 71
Luxfer Prism Company .....

Mace, T. Harry 92
MacKinnon Holmes & Co., Ltd. 73
MacLean Daily Reports 81
Marsh & Henthorn Limited 71
McCoy Company, Henry J. 25
McDougall Caledonian Iron Wks. Co., John 69
McIlwraith, James A. 92
McMillan & Sons, W. N. 100
McNally & Co., William 89
Meadows, George B. 35
Metal Shingle & Siding Co. .....
Metallic Roofing Co., Ltd. 71
Metropolitan Paving Bricks Co. 31
Miller & Co., George M. .....
Mitchell, Chas. H. & Percival H. 92
Mitchell Company, Ltd., Robert 88
Mississquoi Marble Co., Ltd. 82
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Mussens Limited 4
Myers, Oakley 75

National Bridge Co., of Canada, Ltd. 89
National Iron Works Ltd. 91
Neptune Meter Co. 27
Noble, Clarence W. 78
Northwestern Terra Cotta Company 83

Ontario Asphalt Block Co., Limited 78
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Paterson Manufacturing Co. 102
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Rhodes Curry Company, Limited 71
"R. I. W." Damp Resisting Paint Co. ... 19
Rogers Limited, Alfred 11
Rogers Supply Company 25
Roman Stone Co., Limited 15
Rouleau, Jos. N. 92

Sackville Freestone Co., Ltd. 29
Sand & Supplies, Ltd 89
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Shawmut Vitrified Paving Brick Works ... 90
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Steel Company of Canada 28
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Steward, A. P. 74
Stinson-Reeb Brilders' Supply Co. .....
Sturtevant, B. F. 76

Taylor, J. & J. .....
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Tide Water Iron Works 77
Thew Automatic Shovel Co., The 31
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Toronto Furnare & Crematory Co. .....
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Western Canada Contractor 86
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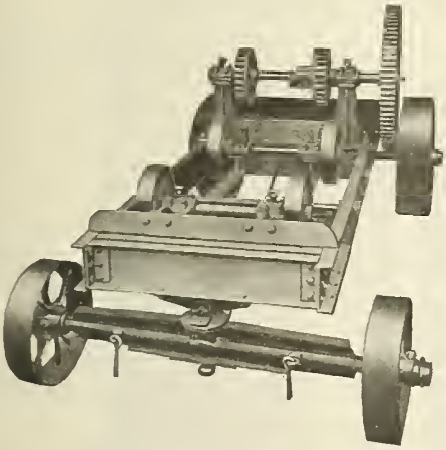

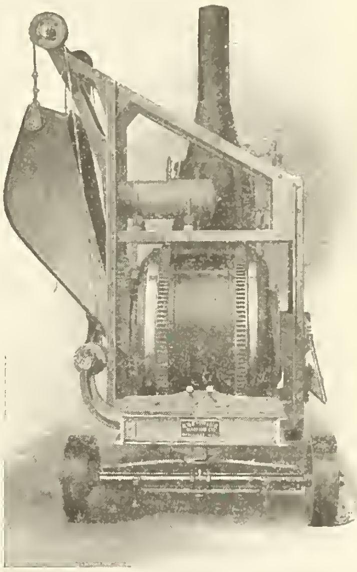

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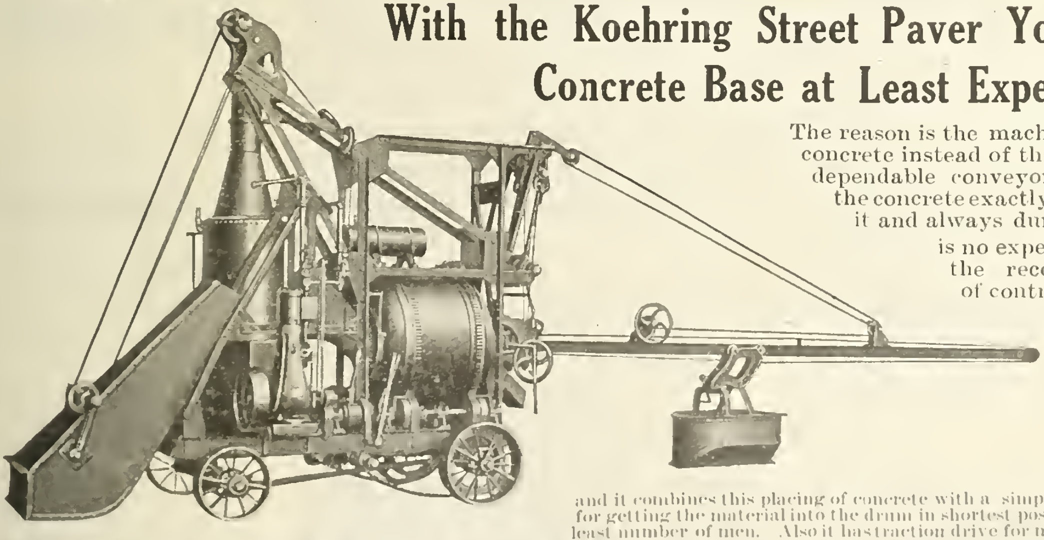

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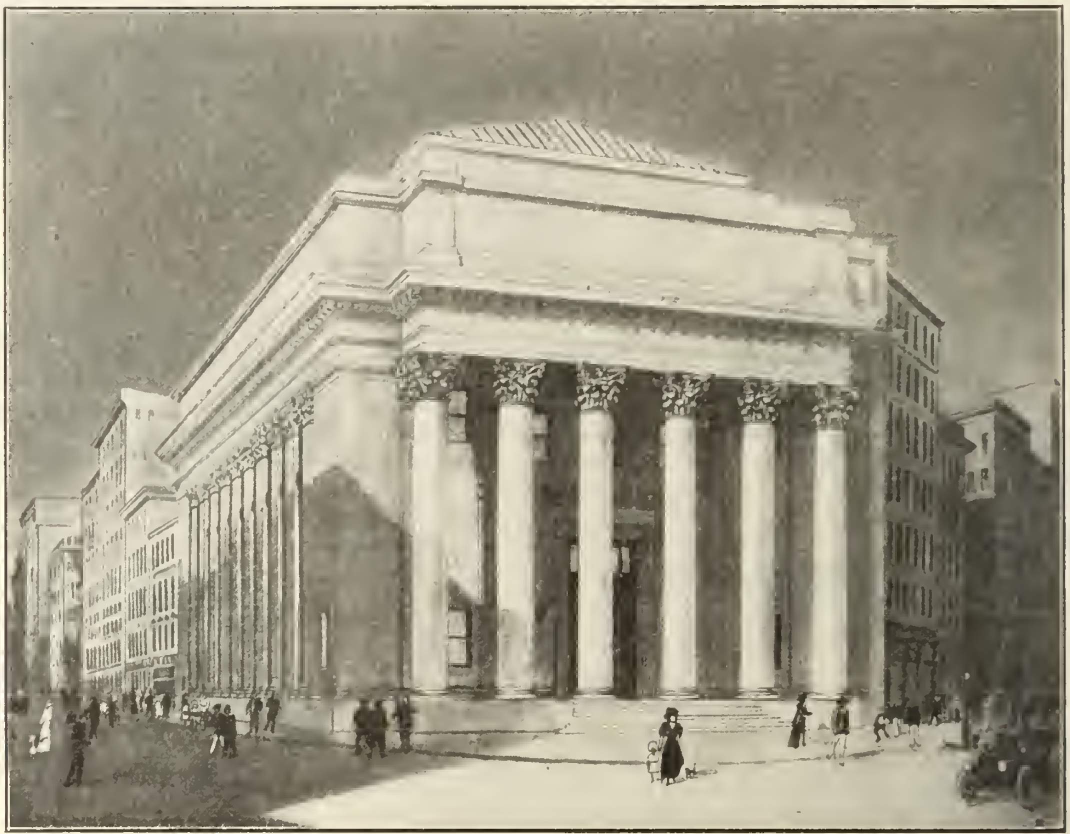

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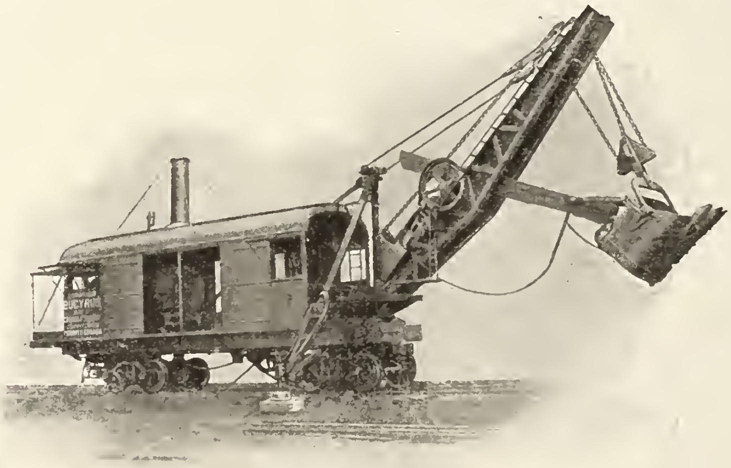

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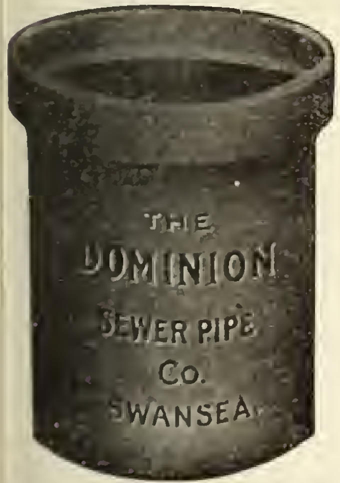

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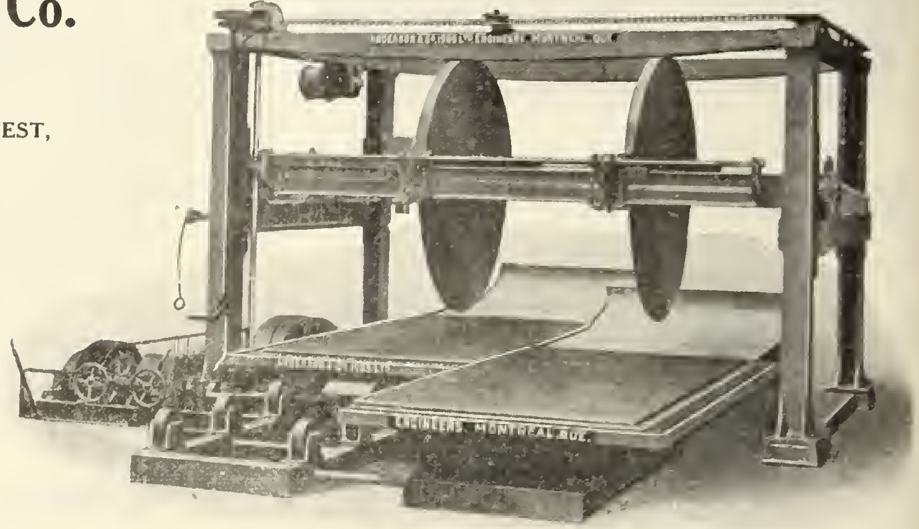

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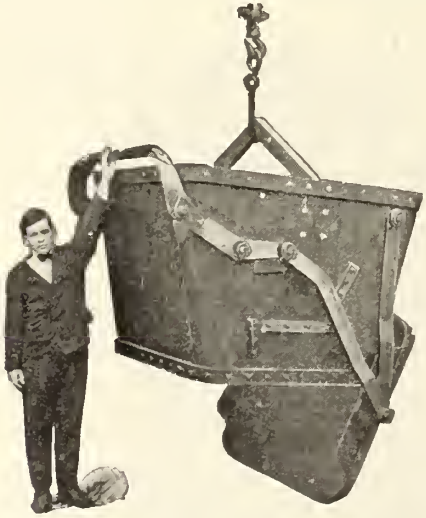

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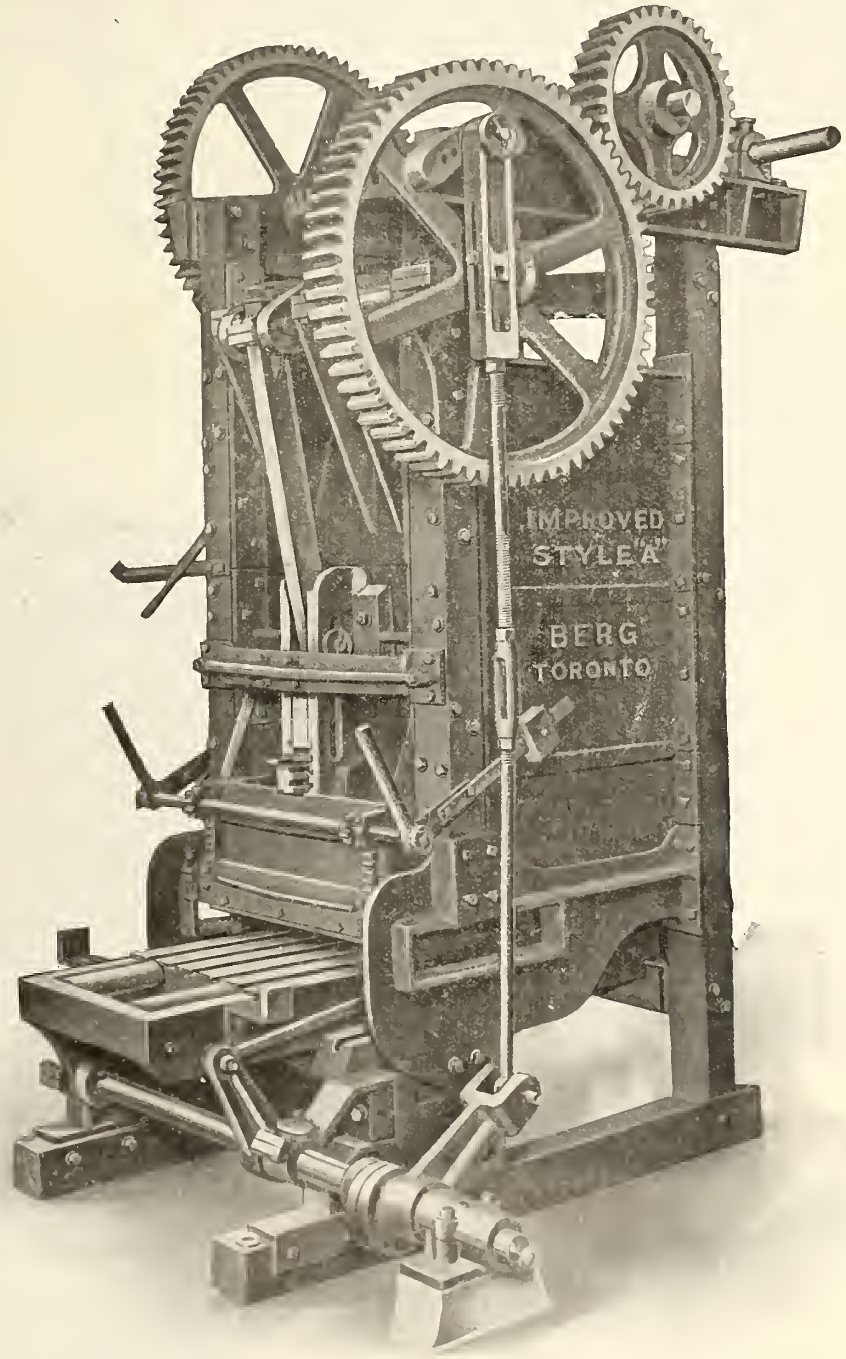

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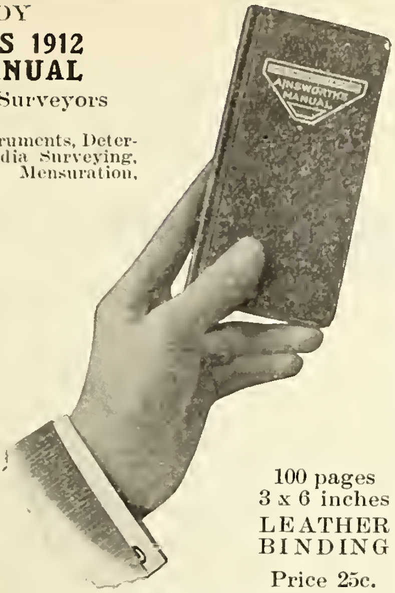

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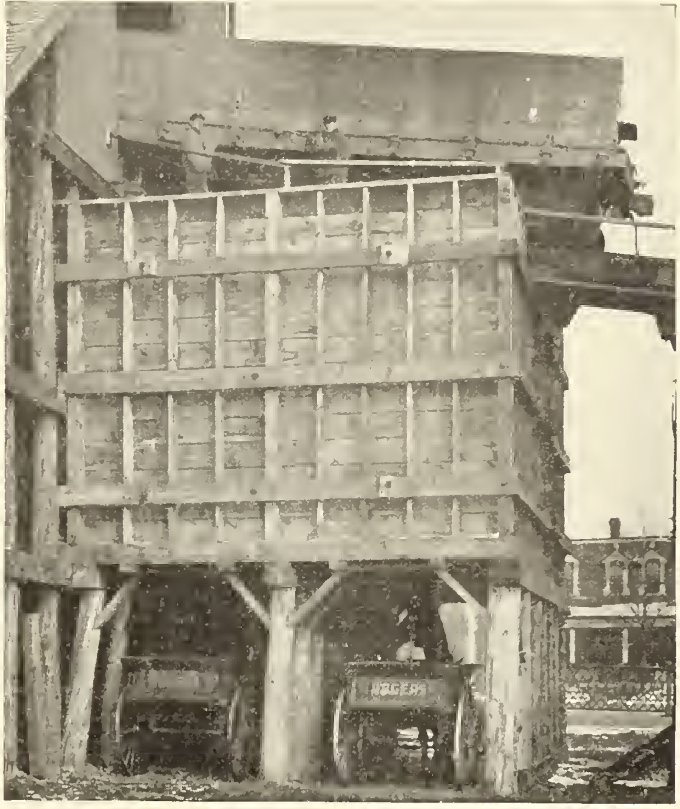

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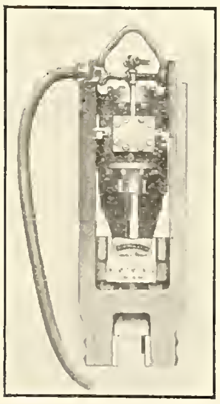

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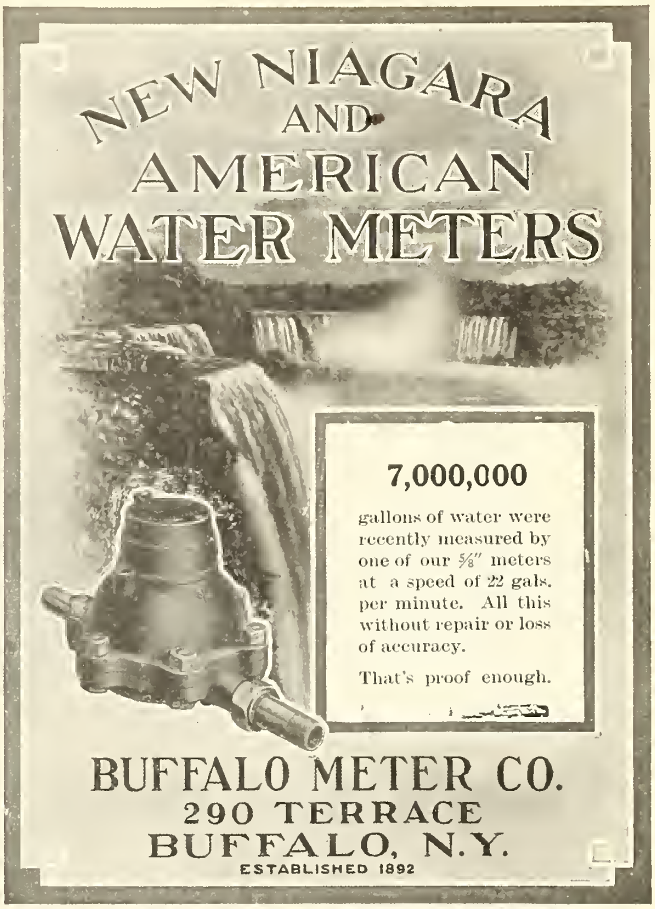

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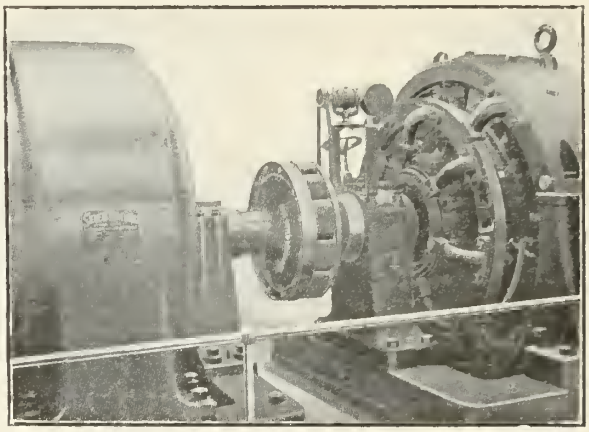

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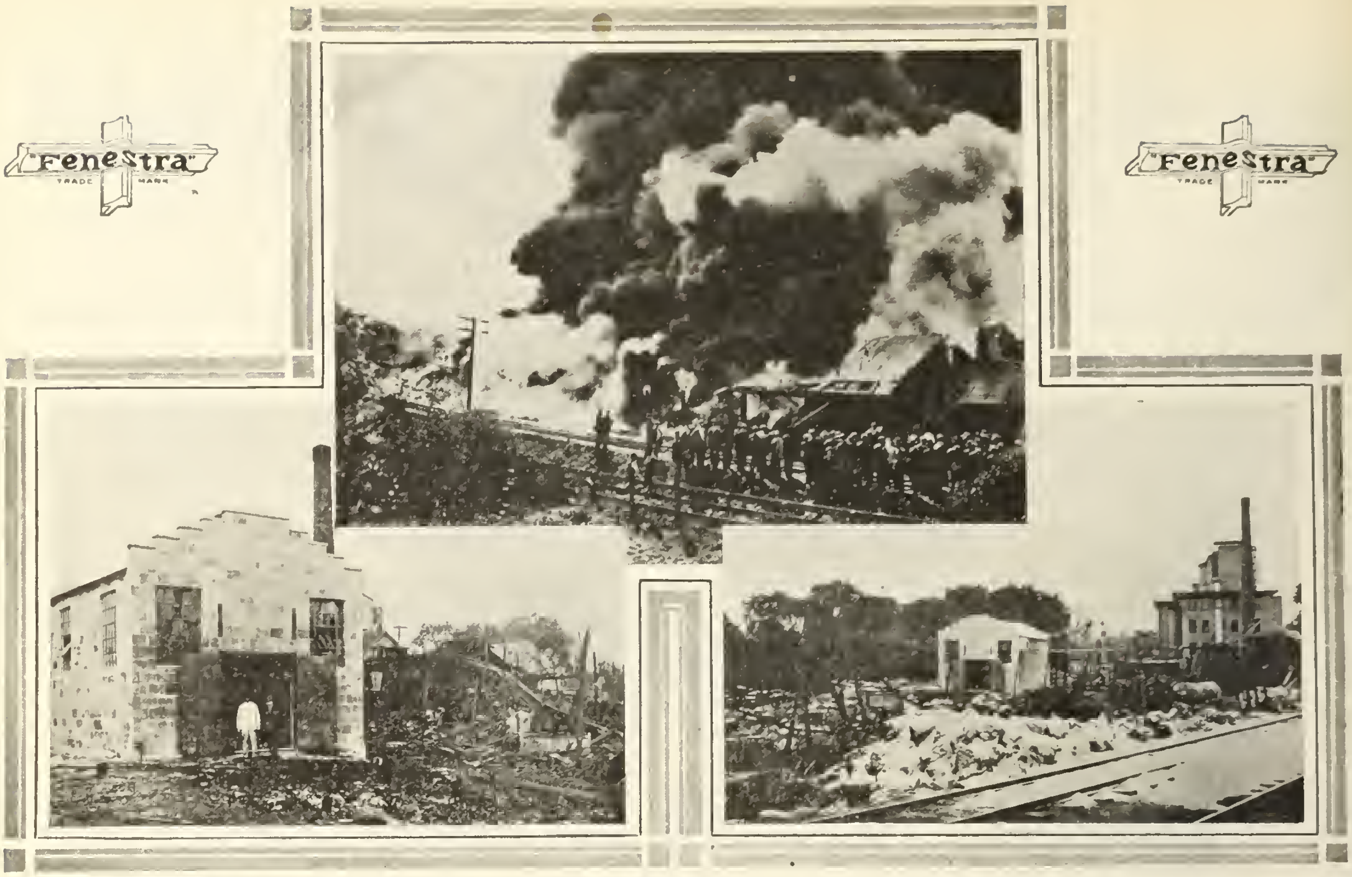

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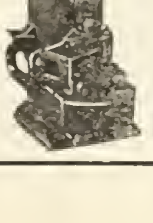

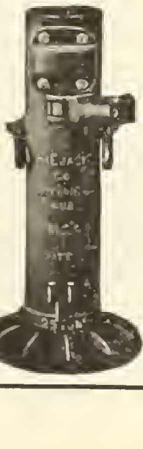

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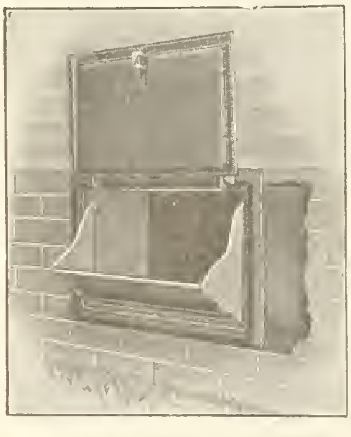

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Built for all purposes. For conveying crushed stone, grain, coal, ore, etc.

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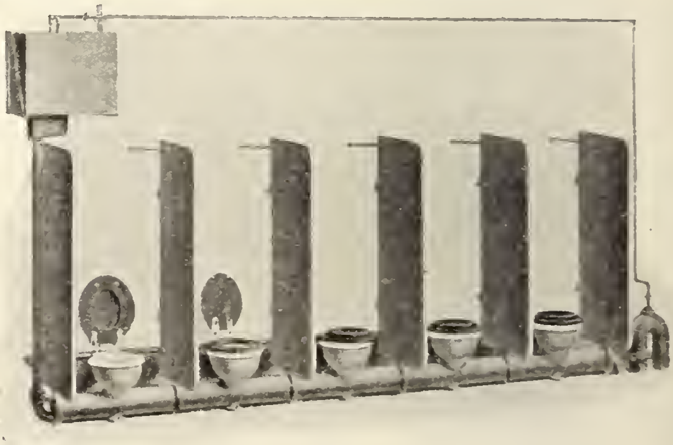

Plate F. 517

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Is the British Manufacturer Turning to Canada ?

IT is refreshing to note that British manufacturers are showing a tendency to awaken to a fuller conception of their shortcomings in regard to colonial fields. It is possible that we may be a little premature in this statement, for we are certainly influenced to some extent by an excellent article entitled "British Manufacturers and the Export Trade," appearing in a recent number of "Engineering" (London). We cannot refrain from feeling a measure of satisfaction at the manner in which the question has been taken up, more particularly as from the admissions made in the article it is clear that the inspiration was obtained, in part at least, from this journal. The article is written with that British candour which makes argument particularly forceful. The statements made are conservative and unbiassed. For instance in the introductory part of the article, while it is urged that much benefit might be secured to British trade if those who negotiate loans of British capital would specify British manufacturing conditions wherever possible, it is pointed out that this does not justify any lack of diligence on the part of British manufacturers to secure the patronage of foreign fields, irrespective of the obligations consequent upon British monetary support: It is frankly admitted that there is a tendency in Great Britain to take the patronizing view that that which British experience has found to be the best over there must necessarily be acceptable to all. The manner in which the error and ignorance of this tendency are exposed indicates a firm grasp of the real situation. "In countries where capital is limited," to quote our contemporary, "there is not, for example, the same desire for durability. Owing to the rapid advances in design made of recent years and continuing to be made, the aim, even in the older countries, is to minimize first cost, and lay aside a large sum for depreciation, so that the life of the apparatus may be brief without loss in the balance sheet. New appliances are thus now substituted for old at an earlier date than would have been commercially justifiable fifteen or twenty years ago."

Last summer the writer spent several weeks in the British field and investigated conditions there with some care. His impressions were given in an article entitled "British Manufacturers and Co-operation," published in the Contract Record for September 6, 1911. In that article emphasis was laid upon the matter of adaptability. The writer found that in a number of cases goods which sold very readily in Great Britain obtained no sale in Canada. This, instead of offering a suggestion to the manufacturer over there, discourages him. The old country factories have their stock patterns and Canada is not worth an expenditure of, perhaps, some thousands of pounds to make innovations in those patterns. Herein, as our London contemporary points out, foreign competitors are making distinct headway in Canada. This is not due in any measure to deficiency in respect of the design or workmanship of British products, for in these particulars they have attained unqualified success. The point is that the design, excellent in itself, is neither acceptable to the buyer in this country nor in conformity with his requirements. British manufacturers must come to a fuller realization that what is good in one country is not necessarily the best in another. They must show more disposition to study not only the general requirements of the country but also the individual requirements of each customer.

Establishing Agencies

Another important matter discussed in detail is that of establishing agencies. Disappointment and dissatisfaction on this score, in the writer's experience, are responsible in no small measure for the ultra-conservatism of the British manufacturer. "Engineering" has some suggestions to offer. These we reproduce below, together with extracts from the concluding portion of the article:

> In order that the requirements may be studied and given effect to, it is incumbent upon manufacturers to have in colonial and foreign countries agents with theoretical knowledge as well as practical experience. The great majority of our manufacturers fail in realizing the importance of these qualifications. A seller, however sauve his manner, and however acute his commercial knowledge, must fail if he is unable to grasp the full significance of the technical requirements put forward by the clients. Indeed, it is possible that in many cases failure to understand the requirements may prevent the agent from recognizing that a standard machine may fulfil the special requirements, with slight modifications. The German and American makers are more inclined to recognize the importance of theoretical and practical experience on the part of their agencies, and are readier to make modifications in design where desired.
>
> Agents, too, should be exclusively British, and, if at all possible, should not represent more than one firm producing the same manufactures, while of this firm's productive capabilities and limitations they should have a thorough knowledge. In this respect British firms fail, and in a most pronounced degree. In Canada and in the Republics of South America one meets at every turn agents who have many "strings to their bow." It is their business to do the best for themselves, and this is better achieved by having many outlets for their energies, especially when payment is by commission. It is, however, for the manufacturer to consider whether the immense potentialities of business in such

countries would not justify the presence of a thoroughly competent engineer to visit not only the great centres of business, but every possible avenue of trade. In this way the firm would in time establish a connection which would compensate for the years of propagandist work. Where one agent represents many firms, excellence in design does not carry its full reward. One instance may suffice—that of an agent who represented three makers of motor-cars, to each of whom he had guaranteed that he would sell ten cars per annum. Car A was popular by reason of its efficiency, and there was no difficulty in selling the ten. As soon as this was within sight the temptation was to urge that the B car or C car was, for the purposes of the client, more acceptable than A, so as to ensure that ten of those would be sold. The same practice obtains in other cases; British business can best be secured by exclusive British agencies of the highest efficiency.

It is idle, too, for these agents to confine themselves and their operations to the large towns. In new countries, such as those we have mentioned, it is incumbent upon manufacturers to ensure that those responsible for the purchasing of plant and appliances should be made conversant with British sources of supply. It is amazing, for instance, to find that in the Far West of the American continent tenders were invited for the supply of turbo-dynamos, and those responsible for the invitations were unaware that there was a Parsons manufacturing works. Again, the engineer of a power-station, who was dissatisfied with American gas-engines, had to apply to us for the names of makers of gas-engines in this country, this being but one of the numerous similar inquiries which we receive due to British trade not being pushed in suitable districts.

However inexcusable may be such lack of knowledge on the part of colonial and foreign engineers, existing conditions must be faced. Literature of the best form may do much, but there is nothing comparable with direct contact by well-educated and thoroughly trained agents. We are satisfied that in this branch of work there is an immense field for the profitable employment of young men who have the theoretical knowledge, practical training, and that presence and buoyancy which are so acceptable in negotiations, particularly with the "colonial." **It is also important that tenders and all proposals should be issued in the language, and quotations made in the currency, of the prospective client, and not in British language, weights, measures and money.***

Insufficient Time Allowance

There is another phase of the subject to which attention should be directed, and in this case the complaint lies at the door of the colonist who is anxious to promote trade with the Mother Country. We refer to the limited time given for the preparation of designs and tenders for works of considerable magnitude. For a long time we have published weekly information regarding important colonial and foreign engineering projects, indicating where particulars can be had, and the dates and destination of the tenders. In many cases, however, we have found that the publication of such notices even as soon as they have reached us was futile, because manufacturers in this country could not send in their tenders within the time specified; indeed, the time in some cases had elapsed before the notice reached us. In the case of Canada, for instance, British manufacturers are, in such event, placed at great disadvantage, because Americans have practically a fortnight longer in which to prepare their scheme. We are glad to note that one of the Canadian papers, THE CONTRACT RECORD, is taking up this question, because it is one of considerable importance.

. . . .

It is important that when an undertaking is decided upon and capital is raised, a return should be earnable at as early a date as possible. On the other hand, it is more important that the greatest experience should be utilized, as by this means only can rapid and economical construction be ensured. . . . . It is with engineering as with athletics—hasty pace at the beginning does not lead to success at the finish or even record time for the event. There must be judgment, which is begotten of experience, and staying power in the one case; in engineering works both qualities are essential—judgment on the part of those responsible for letting the contract, and experience on the part of the contractor, and the organization which is, in mechanics, the equivalent of staying power in physical organism. If, therefore, public authorities aim at the early realization of their schemes as well as economy in execution, an indispensable condition is wide acceptance of their invitations to tender for the work, and this can only be realized by allowing sufficient time for the preparation and forwarding of tenders. This is apart altogether from the cultivation of closer relationship between the home country and the dominions over the seas. For selfish reasons, therefore, as well as to comply with the patriotic instinct, British firms should have a longer time in which to submit their proposals. On the other hand, the same reasons demand that British firms should exert themselves more energetically and with more discrimination to meet the requirements of the colonies and foreign countries, to make possible clients fully cognizant of their work, and to fulfil all requirements in special details and adaptations of standard products.

* * *

A strong point is made above—with justice—of the inadequate time allowance, which has become a disease in this country. This is a perennial subject of comment in these columns—and it will continue to be, so long as these abuses prevail. We say "abuses" because in many cases that have come to our knowledge the thing seems to have been done with malice aforethought. Many Canadian municipalities labor under the narrow conviction that when they have any money to spend they are in duty bound to make the expenditure locally. They are content to take the risk of paying higher prices, of setting up corruption in the ranks of their employees and of giving one or two firms a monopoly,—and all this rather than throw themselves open to competition. Canada's future depends upon her mental growth in such matters as these. We want competition, we want publicity, and we want to strengthen the constructional interests in the country. We must let the British manufacturer know that he is wanted here. We must encourage him to study our requirements. In short, it is to our interests and to his, as well as the duty and privilege of both, to encourage imperial trade.

How to Start Contracting

The difficulty of getting a start in the contracting business keeps many a good man an employee. In this connection The Contractor, of Chicago, has a few suggestions to offer as to ways and means. A portion of the article is reproduced below:—

With an adequate knowledge of construction, and with a small capital there are numerous methods and ways of starting at contracting. If a man wishes to enter the building field, it may be possible to buy certain real estate in some growing section of a city, and by selling part obtain money enough to build houses on the rest. This would be combining construction work with real estate dealing.

Another method is to specialize in some part of building construction. Nearly every building in a city to-day has concrete foundations and footings, and the outfit to do such work is not expensive. The beginner can get in touch with building contractors and show them that he can save them money in this class of work and yet give them a quick and good job. The first few jobs may be difficult to obtain, but a few jobs well done will be the means of getting others.

---

*The heavy type is ours.—Ed.

As soon as a contract is obtained a good foreman should be placed in charge of the work, but the contractor should give the job his personal attention, leaving it only to see about other work. The excavation of the foundation and cellar may also be obtained, but a more expensive outfit is needed for this class of work, yet most of it can be rented. Builders also sublet other classes of work, such as plastering, metal and steel work, painting, etc. In some cities some men are doing well in the line of manufacturing and selling concrete blocks. Others are furnishing mortar to builders, mixing it by machines at a central mixing plant and delivering it in wagons. We have heard of a firm of young men that, from plans furnished, bend and fasten together all reinforcing steel for concrete buildings. The builder furnishes the steel and the sub-contractor does the work on it.

A man with limited means can enter contracting by taking sub-contracts for driving piles. Simple jobs can be undertaken first, and as money is earned better machines can be purchased that will allow of special work being undertaken.

In wagon road work, an easy method for a man to learn about this class of construction is to purchase a steam roller, and if possible operate it himself, renting it to one or more contractors who may be doing work in his neighborhood.

For sewer work, excavating machines can be rented or purchased, and the excavation of the trenches can be sub-contracted. In other cases the concrete work could be obtained from the general contractor.

On railroad construction one of the best methods of getting started is to sub-contract small culverts from the general contractor. Whether these are built with wet or dry rubble masonry or of concrete, the plant is very simple and seldom costs over fifteen hundred dollars; for rubble masonry much less. This work calls into play much executive ability, as stone and sand must be furnished at remote points, cement has often to be hauled long distances, men must be housed and fed, and as the amount of work is small at each place the base of supplies must often be changed and camp frequently moved. A young man doing such work will find his hands full, yet within a year he should make such profits that he could handle larger jobs, as bridge piers, large arches and other structures.

In railroad work a young man can obtain contracts for building fences and erecting telegraph and telephone lines. One of the largest railroad contractors in this country, whose extensive contracts have been described in this journal during the past year, got his start by obtaining a contract for track laying. Renting a track laying machine, he laid 120 miles of track and cleared enough money to start a contract for twenty miles of light railroad construction for himself.

Another prominent contractor, who is now operating in the middle west, made his start by buying a team of horses and hiring them to a contractor, doing his own driving; he earned enough to buy another team. Within two years he had half a dozen teams, and was soon able to take a sub-contract.

The fact is, that as long as sub-contracting is done it is always possible for the ambitious and hard working man to get a start at contracting. If he wants to add to his capital, he should already have had some experience at construction work, otherwise he is apt to lose the money he has, but it is always possible to associate with some one who has had experience.

A few precepts should be kept in mind. Do not wait for money or opportunity to come to you, as Mr. Micawber did, but go out and make something turn up. Do not be ashamed to start with small contracts, and never depend on others, but see to the various details in person. Nothing is to trivial to deserve notice.

See to it that all work is done well and on time. Do not take any advantage of delays or mistakes of others to make excuses as to poor work or slow progress. Do things well, and do them promptly. Study the technical papers, their advertising columns as well as the reading matter, so as to keep posted on all matters in construction work.

Send for catalogues and study them, as many of them contain much information that is of value to contractors. Be quick to learn, but have some self assurance and confidence, and do not fail to impress these things upon others. Learn how to talk in a business like manner to everyone, and see that no one knows as much about your own business as you do. If these suggestions are followed and if a young man will not attempt to handle contracts that are too large for him, he will succeed, and his start will fit him to handle big enterprises as his capital increases.

The School of Science Man

"The School of Science Man" is the title of a poem by Mr. W. Brock, printed in the January issue of Applied Science, the publication of the University of Toronto Engineering Society. The verses are breezy and we cannot refrain from reproducing the following:

Who is this ever present youth?
We notice everywhere
His warlike features, sturdy form,
And head of bristling hair.
His clothes are built on ample lines,
His boots are brilliant tan;
At all the high class shops, he's known
As the "School of Science Man."

And when the School Man graduates,
To roam the wide world o'er,
His fight and vim go out with him,
And push him to the fore.
It matters not where he may be—
Yukon to Yucatan—
With wealth and fame he links his name,
This "School of Science Man."

* * * *

He hits the city every Fall,
To blow his summer stake,
And shakes a fare of pork and beans
To dine on cream and cake.
His survey togs are laid aside,
He shaves his face of tan,
And has his fling at everything—
This "School of Science Man."

And when the final trump rings out,
And Gabriel wakes the dead
From out their sleep so long and deep,
With Adam at their head.
You'll surely see, with certainty,
As the Heavenly ranks you scan,
Some "Arts" and "Meds"—They're all good "heads"—
And many a Science Man.

Reinforced concrete beams with their sides built as quadrants of circles form part of the floor system in a residence at Red Bank, N.J. The beams are spaced 5 ft. on centers and are 8 in. wide at the base, with a total depth of 15 in. from the top of the floor slab to the bottom of the beam. From the bottom of the beam to the bottom of the 3-in. floor slab the surface of the concrete forms a circular arc with a 12-in. radius. The beam is reinforced with two ¾ x 2 in. Kahn bars spaced about 3½ in. on centers and a sheet of No. 26 Hy-Rib is laid coincident with the bottom surface of the slab and is continued to the bottom of the beam. This Hy-Rib comprises a series of metal ribs connected by a metal mesh and these ribs constitute the principal means of bonding the steel with the concrete. It is stated that tests have shown this method of slab reinforcement to be quite satisfactory. The lower surface of the slab is covered with a ½-in. coat of plaster. The beam section extends into the building walls 6 in. and the section of the slab 4 in. Anchor bars 4 ft. long are placed in the slab above each beam and their ends are bent at right angles into the wall section. The concrete in the slab and beams was placed at the same time to obtain monolithic construction.

Engineers' Club of Toronto Progressing

Favorable Reports Presented at the Annual Meeting—Mr. Willis Chipman Elected President — New Club Building Proposed

THERE was a good attendance at the annual meeting of the Engineers' Club of Toronto, held on the evening of Thursday, February 1. Capt. Gamble, who was in the chair, referred to his prospective retirement from the office of president and thanked the members for their support. The directors' report, presented by Capt. Gamble, showed a total membership of 423, made up of 2 life members, 317 resident members, 70 non-resident members and 34 associates. During the year the Club lost two members by death, namely, Mr. James Wilson, resident member, and Mr. F. A. Fifield, associate member. The cost of furnishing and equipping the Club rooms, including decoration and improvements was approximately $7,500, this amount exceeding the estimates by only $500. This is a source of considerable satisfaction to the members. The general attendance of members during 1911 was encouraging and it is expected that this year still more will avail themselves of the facilities provided by the Club in the way of refreshment and social entertainment. The annual Club dinner held last March proved a financial as well as a social success, there being a slight surplus over the expenses. It is suggested that social gatherings be held during the winter so that this element of the Club may be developed. Nineteen lectures and addresses were given before the Club during 1911. The report was received with much approval by the members.

Mr. Willis Chipman

There was considerable discussion anent the proposed substitution of the I. O. U. system for the present plan of issuing tickets, in payment of refreshment and other expenses. Mr. McEvoy favored a combined system. He was opposed to abolishing the tickets entirely on the ground that it might prove a cause of inconvenience to field engineers and others whose work took them to remote parts of the country. He created some amusement by telling the members of a bill for 85 cents which had chased him across the country from Ottawa into the far north, where he was 120 miles away from a postoffice and had no means of remitting payment. On the other hand, it was contended that the I.O.U. system was the more dignified for a Club having the professional status of the Engineers' Club of Toronto. Finally it was recommended that the House Committee introduce the I.O.U. system for the convenience of the permanent resident members and that the ticket plan be continued to facilitate matters for those who favored that method of payment.

The manner of ballotting for the election of five directors caused a division among the members. One plan favored was that five members receiving the highest number of votes on one ballot should be elected, and the other, which was finally adopted, was that the members elected should receive a majority of the votes of those present. The duties of the scrutineers, Messrs. K. L. Aitken and G. R. Mickle, proved no sinecure, for five or six ballots were necessary. The gentlemen elected were Messrs. E. L. Cousins, A. J. Van Nostrand, Jas. McEvoy, G. G. Powell and A. L. McAllister. These appointments were made to fill vacancies created by the annual retirement of five directors. At a subsequent meeting of the directors the new President and Vice-presidents were chosen. The full directorate of the Club for 1912 is as follows: President, Mr. Willis Chipman; 1st Vice-President, Mr. T. S. Young; 2nd Vice-President, Mr. J. J. Ashworth; 3rd Vice President, Mr. C. H. Heys. Directors: Messrs. Edmund Burke, R. A. Baldwin, W. A. Bucke, E. L. Cousins, W. E. Douglas, H. E. T. Haultain~~, E. A. James~~, Jas. McEvoy, A. L. McAllister, G. G. Powell and A. J. Von Nostrand. Secretary-Treasurer, Mr. R. B. Wolsey.

Club Building Proposed

An important matter that came up for discussion was the proposal to secure other quarters for the Club. Suggestions were offered by several of the members, and the recommendations of the special committee appointed to deal with this matter will be awaited with interest. A few speakers considered that the Club was concerned only with obtaining suitable quarters in a good building in the business part of the city, and that it would suffice if some arrangements could be made for the upper portion of some modern bank or office building. Mr. Chipman made a strong plea for the erection of an Engineers' Club building of modern and somewhat elaborate design. He contended that the home of the engineering profession should be second to none in the city, and suggested that it would not be a difficult matter to finance a building scheme involving an expenditure of from $250,000 to $500,000. The project was one that called for confidence and enterprise. Mr. Chipman's views were supported by Mr. Frank Barber and others, who cited cases where such ventures had been made financial successes in certain western cities of the United States.

Proper Methods for Thawing Dynamite

Every user of dynamite knows that it freezes at higher temperatures than water and therefore provides arrangements for thawing it. Frequently, however, says a writer in our Chicago contemporary, The Contractor, especially in the spring and fall when the days are warm and the nights cool, the necessary care and attention are not given to this very important matter. There is no poorer economy than to neglect to properly and thoroughly thaw dynamite. This can be overcome only by careful inspection at all times except in very warm weather, and by the adoption of the best thawing methods only.

Neither frozen nor chilled dynamite will give the best results and it is more expensive to use dynamite which is not properly thawed than to provide proper facilities for thawing it.

Nobody can afford to resort to any thawing methods other than those that are safe and effective. Dynamite can be thawed with comparative safety if approved methods are used, but between three hundred and four hundred men are killed and injured each year while thawing it in ways which are distinctly condemned.

Regular gelatin, ammonia and nitro glycerin dynamites may freeze or chill quickly if exposed to a temperature of 45 degrees F. to 50 degrees F., and require considerable time to thoroughly thaw.

If a thawing house is too expensive, we would then suggest that a small building heated by steam or hot water pipes, or radiators, be constructed fifty feet or more away from any other building or mine workings.

These pipes or radiators should be placed in one end of the room, and encased in such a manner that it will not be possible for anyone to put dynamite where it can touch them, or where any drop of nitroglycerin, which might possibly exude from the cartridges, could come in contact with the pipes or radiators, and so possibly cause an explosion.

At mining plants or other works where steam is used, a good thawer can be provided by building a small house, in one end of which are coils of pipe through which the exhaust steam from the engine passes. Because of the fact that the steam is not confined, it is impossible to create exceedingly high temperatures in such a room.

The temperature of the thaw house should not exceed 80 degrees F.

Along the sides of such a room away from the heater, shelves should be placed where the cartridges to be warmed should be laid on their sides until thoroughly thawed.

When larger quantities of dynamite are required on temporary work, an excellent device is to place the cartridges in a large, dry milk can, water tight, the bottom of which is covered with sawdust—the can to be placed in a cask or barrel containing water, which has been previously heated by a jet of steam, or if steam is not available, the cask may be filled with warm water as often as necessary.

If the water in the cask is to be heated by a jet of steam, the milk can containing the dynamite must always be taken out of the cask while the water is being heated. The cask should be covered with insulating material to retain the heat.

Manure is frequently used to thaw dynamite, and is fairly satisfactory, provided always that is fresh. The cartridges should be laid on their sides in a box imbedded in the manure where they should remain until soft.

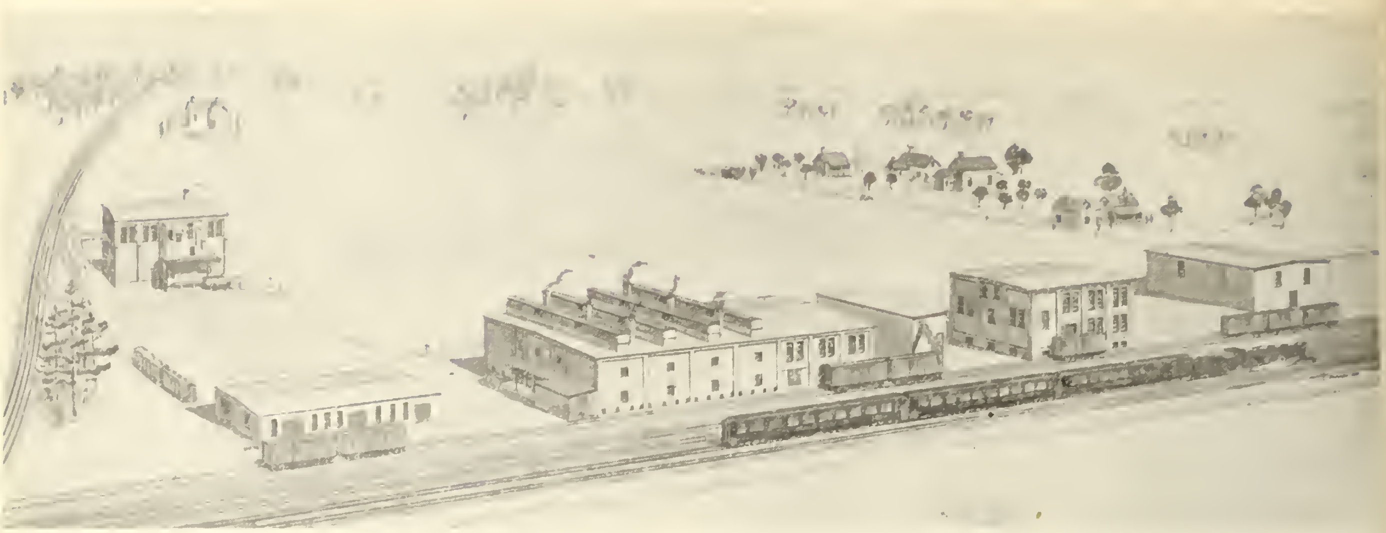
Under no circumstances should cartridges be allowed to come into contact with the manure as they might absorb moisture.

For temporary use where only a small amount of dynamite would be required, no improvement has yet been made over the old fashioned double kettle, which is simply a large kettle containing warm water in which is placed a smaller kettle containing the dynamite. The water should always be warmed in a separate vessel, and poured from that into a larger kettle and fresh warm water should be used for each thawing. Neither of the kettles should ever be placed over a fire or other radiator.

Saskatchewan's Splendid New Hospital at Battleford

We give herewith a view of the new Hospital for the Insane, which is being erected at Battleford, Sask., according to plans prepared by Messrs. Storey & Van Egmond, of Regina. The contract for the main building was let last fall to the Saskatchewan Building & Construction Company for $450,000. This includes none of the plumbing or equipment, nor does it cover the power house or any of the auxiliary buildings. The building is over 700 feet long and is divided into three portions. The central division is three storeys high and will be known as the Administration Block. The whole structure is absolutely fireproof. The walls are of solid brick and the floors and beams of reinforced concrete, while the linings of the walls and all partitions are tile, the whole being covered by a metal roof.

HOSPITAL FOR THE INSANE · BATTLEFORD · STOREY & VAN EGMOND · REGINA



General view of the National Land, Fruit and Packing Company's Plant

An Interesting Plant at Mimico, Ont.

Structural Features of Buildings presenting somewhat Unusual Problems—Arrangement of Roof and Ventilation—Use of Concrete Slab Walls

THE plant of the National Land, Fruit & Packing Co., Ltd., is situated about one and a half miles west of Mimico on the G. T. R., and is used for the manufacture of apple products of all kinds. A general view of the plant is given in the above illustration. The plant consists of six buildings, which were designed so as to be particularly adaptable for the special purpose for which they are intended. All the apples entering the plant are delivered to the sorting building, where they are sorted and distributed to the other buildings to be manufactured into the product for which they are the most suitable. The whole plant will be capable of handling from six to eight carloads of apples a day during five months of the year.

The building at the right of the general view is a tank house containing eleven tanks having a total capacity of about 250,000 gallons. This building has wooden framing and is covered both sides and roof with concrete slabs. These slabs are one and a half inches thick and are reinforced with mesh and rods. This type of construction combines cheapness and fire-resisting qualities, as the joists are all three feet apart and the slabs can be made and put on more cheaply than any similar construction. The slabs are eighteen inches wide and six feet long and were allowed to mature under cover one week before being used. The roofing consists of four-ply tar and gravel.

The second building from the right is the vinegar building. This structure has two storeys and basement, the walls of the basement being concrete and the others red brick. The interior beams and posts are yellow pine and are arranged to carry heavy loads. The first floor is spruce covered with a maple wearing floor. The second floor is spruce. The roof is tar and gravel.

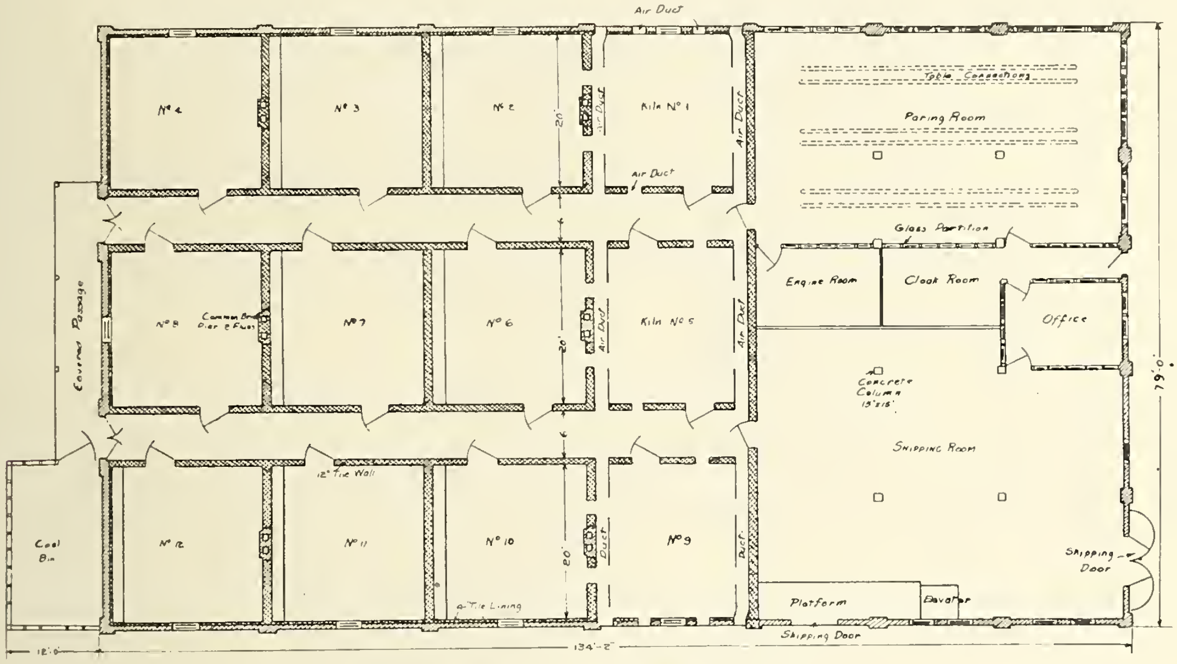
The next building is the sorting building, which contains six bins having total capacity for about ten carloads of apples. The bins have wooden framework, with sheeting inside, and are provided with suitable doors, chutes, etc. The walls of the building consist of two-inch cement plaster on Hy-rib, the latter being covered on both sides.

The evaporator is the large building and is 79 feet

Vinegar plant, storage house and evaporator building under construction

Cold storage tank room on ground floor and cider manufacturing plant above by 134 feet and two storeys high. This building is used for the evaporation of apples which enter the paring room, shown on the plan. From here they are carried automatically up and through the bleachers, which, on account of the sulphur fumes, are located on the second floor outside the building. From the bleachers they pass into the slicer and from there into trucks which are wheeled by hand into the different kilns. Here the apples are spread uniformly over the floor to dry. The furnaces are placed one in each kiln on the ground floor and absorbing air passes through the apples absorbing their moisture and going out through the louvres on the roof.

The building, as can be seen, contains twelve kilns and as the furnace in each room is kept at a dull red heat day and night it involves great risk of fire which results in the payment of a very high insurance premium. This, in fact, is almost prohibitive in the case of inflammable buildings of wood. The fireproof construction in this case did not cost much more than the other. In addition to the advantage of being fireproof it allows the floors to be flooded and well washed with a hose; also the tile lining maintains a uniform temperature of the kilns, while the depreciation is very materially lessened and the danger of loss of season's stock is reduced to a minimum.



Ground floor plan Evaporator Building

The building has concrete foundations, exterior walls of red brick, and floors and roof of reinforced concrete. The exterior walls of kilns are lined with four-inch tile and the partitions between the kilns are twelve-inch tile on the ground floor and eight-inch tile on the first floor. The reinforced concrete is slab and beam construction, round rods being used. The roof was figured for a live load of 25 lbs. per sq. ft., and the floor for 175 lbs. per sq. ft. The first floor of the kilns is of necessity wood, and consists of basswood slats, splayed on both sides with one-eighth inch clearance between the slats. These are supported by 2-in. x 6-in. joists, while an I-beam runs along the centre line of the kilns under the joists. The air passes up through the openings between the strips and goes through the apples and out of the ventilators.

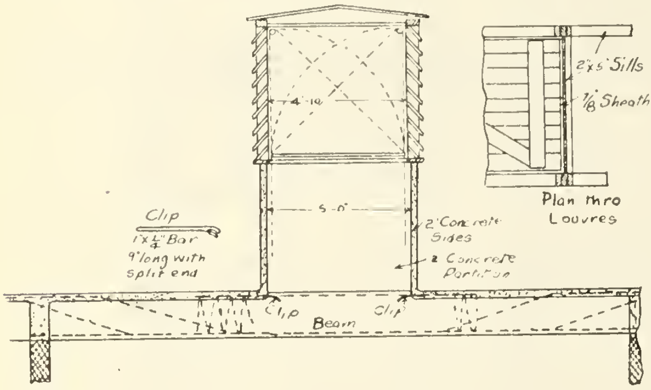
A novel feature is the arrangement of flat roof and ventilators. In an evaporator it is necessary to provide a good draught and at the same time one which will carry the vapors uniformly from all points in the kiln so as to dry all the stock at the same rate. This is usually done by using a pitched roof and putting the ventilators at the ridge. In the present building the roof has a very slight pitch, but the walls are higher so that the vapors may become uniformly distributed before coming against the roof. To give a good draught the ventilators are run up four feet before the louvres start, thus giving a chimney effect. The lower part of the ventilators is constructed of cement plaster on Hy-rib and the top part containing the louvres, of

Tank house.—Note concrete slab walls

Evaporator plant

wood, bolted securely to the concrete. The ventilators run across the building, vertical partitions separating the kilns and passage-ways. The light for the passage-ways is obtained by placing windows in the ventilators in place of the louvres. In order that the draught of the kilns should not be interferred with by the wind, flat doors are used. These can be pulled up by means of ropes so as to close off the louvres on either side, or to choke the draught, as the case may be. The air to be heated comes from the outside and enters the kiln on the ground level, being distributed evenly on the four sides of the room by means of iron ducts. This building was in use nine weeks from the date of signing the contract.

The low building next to the evaporator is a temporary storage which is to be replaced by a large reinforced concrete structure. The other building, used for the manufacture of cider, is a red brick structure two storeys high. The lower floor is used as a cold storage and is insulated on all sides, as well as the roof and floor, by three-inch cork put on in two layers and covered with half-inch cement plaster on the walls and roof and three and one-half in. concrete on the floor. The upper floor is used for manufacturing and is made waterproof by several layers of paper well covered with tar, placed between the maple floor and the spruce floor.



Section through ventilator

The plant was designed and erected under the supervision of Messrs. Harry H. Angus and A. H. Harkness, consulting engineers, Confederation Life Building, Toronto.

Steel Highway Bridges

Mr. Neal Garver, instructor in structural engineering at the University of Illinois, stated in a paper presented recently before the Illinois Society of Engineers and Surveyors, that during several years' experience in bridge work with a large company he had observed on more than one occasion that the contractor did not attempt to slight either the fabrication or erecting work on railroad bridges, but in the case of a highway structure far less care was exercised on many occasions.

In the construction of small steel highway bridges, it is an exception to inspect the steel before it leaves the fabricating plant, which Mr. Garver regarded as a mistake. There are many details, some of considerable consequence, which can be easily remedied at the shop, but are difficult or expensive to change in the field. For example, some 1/4-in. lacing bars were used on a bridge where 5/16-in. bars were required. In another case, Lomas nuts of the same size were used for 3 and 3/4-in. pins; the nuts were all standard size for the 3-in. pins, but for the 3 3/4-in. pins the recess in the nut was insufficient to pass over the shoulder of the pin. In still another case the specifications required all finished surfaces to be painted with white lead and tallow before leaving the shop. This was mentioned on the shop drawings. It was further required that the masonry and shoe plates on which the expansion rollers moved should be planed. The pins were unpainted and had become quite rusty, the rollers had been painted with a heavy black paint, and the masonry and shoe plates were unplaned. This structure was a 120-ft. span with adjustable counters in the trusses. In order to have the required net sections, the screw ends should have been upset, but they were not. On a five-panel 80-ft. pony-truss span the shop drawings called for the two end panels of each of the trusses to be riveted up complete and the members of the middle panels field-riveted. Instead of being shipped as required, the bridge was sent out completely knocked down, no two members being riveted together. All riveted points on the two end panels had been computed for shop rivets; the specifications under which the bridge was inspected required the allowable shear on field rivets to be reduced 20 per cent. below that on shop rivets, so that by this failure to follow directions the efficacy of the new bridge was made only 80 per cent. of what it should have been.

Inexperienced Foremen

Mr. Garver is of the opinion that many of the weak points in small steel highway bridges, due to defects of erection, can be traced directly to the foreman. He believes that poorly driven steel rivets are to be found on practically every highway bridge job. Well-driven rivets require both care and experience, qualifications usually lacking in the foremen for such work. It is not unusual to find rivet holes filled with cement and painted over. Turned bolts furnished for highway bridge work are often machine or pressed bolts turned down about 1/16 in. smaller than the rivet hole and not to a driving fit, as required by specifications. Real turned bolts are turned out complete from the steel bar.

The packing of pins is often carelessly done, and sometimes the foreman is hardly to blame for this because no sketches are given on the drawings to indicate in what order the bars are to be placed on the pins. Without such a sketch it may happen that the bending moment on the pin will be much greater than it was calculated to receive.

In the design of highway bridge details, a common point of weakness is the connection of the floor beams to the posts, which is lacking in rigidity. Sometimes the post is so detailed at this point as to reduce its efficiency materially in taking compressive stresses. For example, the post may be made up of two channels laced, and the floor beam suspended below the bottom chord. The channels are cut off above the bottom chord eye-bars to clear the eye-bar heads and only narrow plates are extended down to carry the floor beam. The omission of any provision to carry the outside and joists where they come close to the shoe and cannot rest on the masonry is often observed in plans.

Suggestions Looking to Improvement

Mr. Garver's suggestions for improving highway bridge work are as follows:

1. In states having highway commissions the

highway engineer should get up standard shop drawings for all spans in common use. The drawings should be carefully checked, all poor details eliminated and all mistakes corrected.

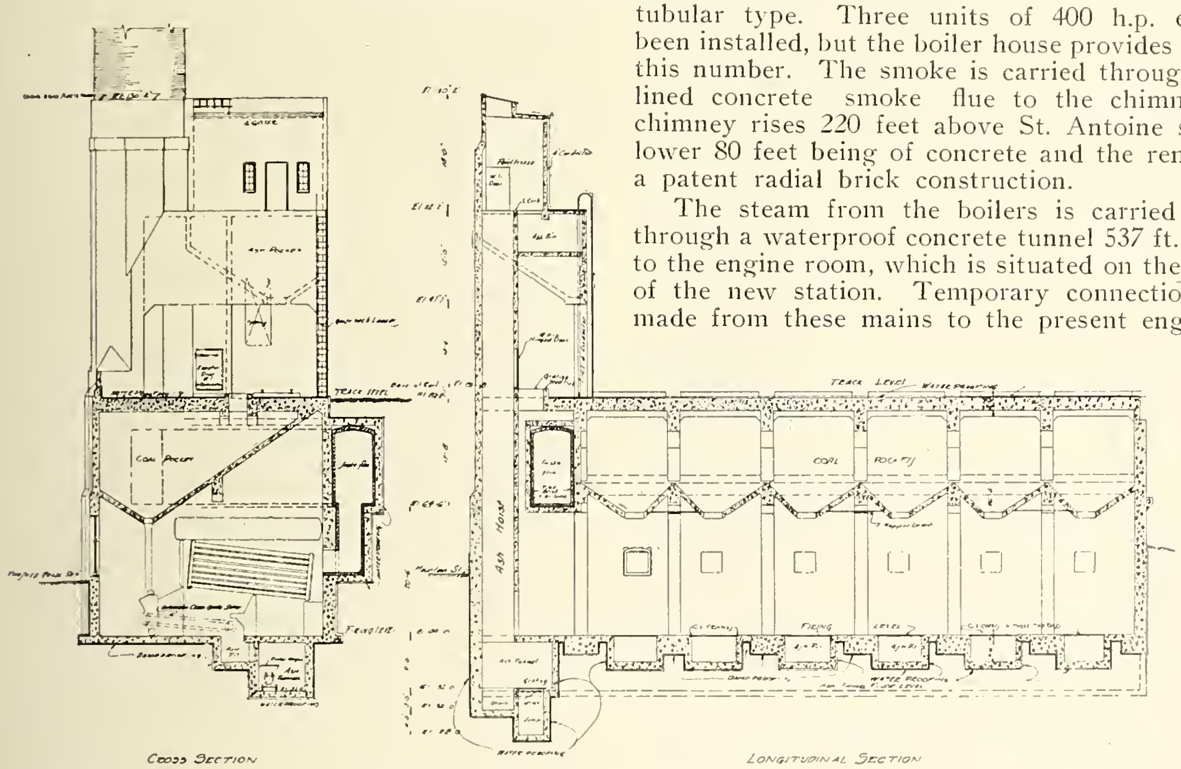
2. All fabricated materials should be carefully inspected by an experienced man before being shipped from the fabricating plant. This will eliminate all shop errors, intentional or otherwise, and provide first-class work to go into the field.

3. The work should be carefully inspected in the field after erection and before its acceptance.

4. All companies bidding on this class of work should be given due notice of what to expect, so there can be no complaint of its enforcement.

5. Mr. Garver believes that there is only one price basis fair to both parties concerned, and that is a pound-price basis.

6. The bids should be called for, not for a single bridge at a time, but for the steel bridges for the entire state for a full year, on a pound-price basis, bids being called for on each class of work, with a maximum and minimum tonnage to be ordered under those bids. The objection to this system might be that it would eliminate the small bridge companies. The time has arrived, Mr. Garver considers, when economy should be practised in public as well as private affairs, and it is quite certain that private corporations would not use the methods that have been in vogue generally in the management of public business. If the small bridge companies can do as good work at the same price as a large concern, they would not necessarily be eliminated.



Sections through C. P. R. Boiler House

According to the local press a number of concerns are negotiating for sites upon which to establish brick plants in the city of Edmonton, Alta. Comment is made that there will be no possibility of a shortage of brick in the northern capital. It is to be hoped that this will not induce any widespread migration of eastern contractors.

C. P. R. Construction at Montreal

A new boiler house to supply the Windsor Street yards and station has been constructed by the C.P.R. at the corner of Mountain and St. Antoine streets, Montreal. The building is approximately 110 ft. long x 40 ft. wide x 34 ft. high, the roof being constructed to carry necessary tracks to supply coal, and remove ashes. The coal will be delivered from the cars through doors in the roof to six large bunkers, falling from them through C. I. grates into iron chutes, where it is measured. From these chutes it drops on to automatic chain grate stokers, where it is burned. The ashes drop off the end of the grate into ash pits below the boiler room floor, from which they are taken in narrow gauge cars and conveyed to the ash hoist which lifts them to an ash hopper over the track. From this hopper they slide through a gate into cars and are disposed of.

The boilers are of the B. & W. horizontal return tubular type. Three units of 400 h.p. each have been installed, but the boiler house provides for double this number. The smoke is carried through a brick-lined concrete smoke flue to the chimney. This chimney rises 220 feet above St. Antoine street, the lower 80 feet being of concrete and the remainder of a patent radial brick construction.

The steam from the boilers is carried in mains through a waterproof concrete tunnel 537 ft. 8 in. long to the engine room, which is situated on the west side of the new station. Temporary connection will be made from these mains to the present engine room, which will continue in operation till the new one is finished. The boiler house is connected to the station proper by a retaining wall and viaduct, which will allow for an extension of the present track system. The whole construction is of reinforced concrete and was carried out by Messrs. Byers & Anglin, general contractors. The design was made in the office of Mr. W. S. Painter, formerly C.P.R. architect. The construction was carried out under the supervision of Mr. F. L. Ellingwood, Superintendent of Building Construction; Mr. Geo. W. Smith, Local Superintendent, Windsor terminal; and Mr. J. R. Hagelin, Assistant to Local Superintendent.

A Portland, Ore., contractor had a narrow escape at Vancouver last week of losing his deposit cheque for $2,000 because he submitted his tender on ordinary writing paper and not on the special form prescribed for the purpose.

The Cement Gun: Its Use and Application

Primary Idea Originated not with an Engineer or a Contractor but with a Taxidermist — Detailed Description of Process*

By William A. Jordan

IN recent years concrete made from hydraulic cement has become an important factor in structures of every kind, because of the ease and cheapness with which it may be handled, and the convenience with which it can be deposited in positions which would be difficult and expensive to fill by the use of any other material.

Since the practice of employing re-enforcement has become general, the use of concrete has been widely extended, until now, even slight improvements either in the modes of application or the development of new fields of usefulness, receive thoughtful consideration.

Since the first commercial exploitation of cement, considerable time elapsed before the value of concrete was accorded general recognition. This was, in a great measure, due to unfamiliarity with the material, and to certain qualities supposed to be inherent in cement. Judged by laboratory tests, where the necessary ingredients of mortar or concrete could be perfectly proportioned and carefully incorporated, results were fairly satisfactory; however, in practice, even up to the present time it has never been possible to closely approximate laboratory tests.

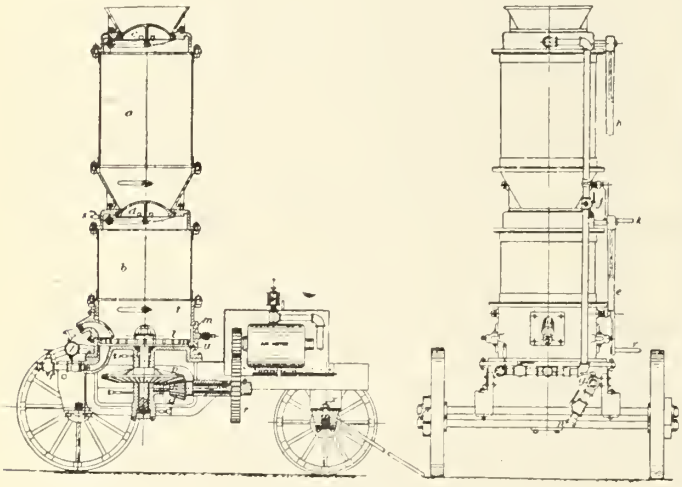


Fig. 1.—Cross Section of Cement Gun.

Dry mixed material placed in cylinder "a." Valve "c" closed and air pressure equalized in cylinders "a" and "b." Valve "d" opened and material drops into lower cylinder "b." The process is then repeated. The feed wheel "s" is revolved by an air motor through the gears "r" and "p." Compressed air admitted through valve "f" blows the material upward and out through the goose-neck shown above the air pressure gauge into a flexible hose.

For example, taking so simple an operation as the mixing of cement mortar, composed of one part of cement and two of sand, in practice it will be found difficult, if not impossible, to obtain the desired consistency, if the theoretical amount of water required to temper the mass is used. On the one hand, the theoretical amount of water forms a mortar too stiff to handle, while on the other hand, any excess of water weakens the mortar by causing voids.

It is reasonable to infer, in the absence of evidence to the contrary, that when a batch of cement-mortar or concrete is gauged with water, that a certain proportion of the minute particles of the cement will set, lose elasticity and the power to bond other material in advance of the bulk of cement used in the entire mass. If this occurs before the mortar or concrete is in place, the result must be a loss of ultimate strength proportionate to the percentage of particles whose powers of adhesion have been thus permanently lost.

In the Cement Gun process, no excess water can remain in the mortar to later cause voids, neither is it possible for the finest particles of the cement to begin to set before the mortar is placed.

As will be shown later, experiments have proved that when cement mortar is tempered with water at the instant that it is deposited in place, the strength of the mortar is greatly increased. This increase in strength is due to more perfect mixing, to the elimination of loss by the premature setting of a considerable portion of the particles of the cement, and to the greater density of "gun" placed mortar.

Some of the conditions which have acted to restrict the use and development of concrete may be summed up as follows:

First: The difficulty of securing a sufficiently uniform mixture to produce a homogeneous mass.

Second: The difficulty of applying thin layers of cement mortar of any but the richest mixtures on ceilings or walls unless supported by forms.

Third: The necessity of employing costly forms or molds to hold the material and to give it shape until it is sufficiently strong to bear its own weight.

Fourth: The porosity of the finished mass. Porosity means the presence of pores or voids—in other words, porosity is the opposite of density; a porous mass is not dense. These voids may be caused by the use of too great a proportion of water, careless tamping or by the use of sand and stone improperly graded. Excessive porosity not only weakens the finished work to an unknown and undeterminate degree, but affects the durability of the work by admitting moisture, which may decompose the cement and corrode the iron or steel used for re-enforcement. A mass of concrete may, because of its porosity, be weakened and eventually disintegrated by water.

Fifth: Permeability, the quality or condition which allows water to pass through the mass, is closely allied to porosity. Because of the permeability of concrete masses, it is often necessary to employ various methods of waterproofing, or to adopt other more expensive materials. Were it possible to cheaply and with certainty overcome this defect, Hydraulic Cement Concrete would be more universally used. When concrete is laid in exposed positions where it is subjected to the action of frost, gradual disintegration may take place, and when the concrete mass under such conditions is excessively porous, total destruction may follow. Even when concrete is used in positions where impermeability, or waterproof qualities are apparently unimportant, the fact remains that masses of concrete of a very porous nature are far more liable to surface cracking and gradual disintegration than would otherwise be the case.

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*Before the American Society of Engineering-Contractors.

Sixth: Cement grout, or a liquid mortar made from cement and sand thin enough to flow, is of necessity employed to a certain extent where cavities exist which cannot be otherwise filled. The value and strength of the aggregate thus formed is, however, very questionable, for when such thin mixtures are used, the sand content settles to the bottom, and the cement remains above, with the result that that portion of the aggregate that may be composed of sand is of little value.

The methods of placing concrete in construction are, relatively, not as far advanced as the excellency of the material itself warrants.

Hydraulic Cement

It will be observed that each of the faults and difficulties above enumerated is chargeable to the methods employed in placing the material. Hydraulic Cement as at present manufactured is a reliable and uniform material possessing definite and well known characteristics. To advance the position that concrete occupies among the building materials of modern civilization requires only the discovery and exploitation of some method of application that will insure in the finished work the uniformity and strength known to be possible, but in practice never realized.

It is well understood that perfection in certain arts can be achieved only by the skilled hand and trained eye of the master craftsman. It is not even desirable to substitute the precision of a machine for the chisel of the sculptor or the brush of the painter. But in certain industrial arts, the hand worker, however skilled he may be, must be aided and supplemented by machinery. It is not so long ago that the invention of the first power boom, forever ended the toil of countless hand weavers, and it is still within the memory of men when the sickle was for all time retired by the modern reaper.

Among the various materials used in building construction, Hydraulic Cement appears to be one for which machine application might be most expected, and accordingly, it is with this material that inventors have experimented more extensively than with any other.

The solution of the problem came with the discovery of the so-called "Cement Gun." As a matter of fact, this is not a "gun" in the ordinary meaning of the word, but it was so designated from the fact that the material is projected from the nozzle with considerable force and literally "shot" into place.

Strange to relate, the apparatus was not invented by an engineer or a cement worker, or even a contractor or builder. It was originally conceived by Mr. C. F. Akeley, a taxidermist of Chicago. His idea for the use of the Cement Gun was to rapidly and economically build up forms over which the skins of the larger mammals such as elephants and hippopotami might be stretched.

Mr. Akeley was also a member of the Field Museum Committee and had charge of the remodeling and preserving one of the old World's Fair buildings in Jackson Park, Chicago, that had been given to the Field Museum Association. An appropriation of about $20,000 had been made to carry out the necessary repairs on the building before being used by the Association for its exhibition purposes.

Mr. Akeley conceived the very brilliant idea of enlarging the Cement Gun and then to cover the entire building with stucco work by means of it. The experiment was highly successful and the work was performed rapidly and well within the appropriation.

This was the first practical work done by the Cement Gun, and its possibilities were demonstrated beyond any doubt. The apparatus was then studied in the laboratory and subjected to various tests. At the same time different types of "Guns" were designed and numerous mechanical changes made as experiments showed the necessity.

The Cement Gun consists essentially of a hopper into which the cementitious materials are placed, a hose connected to the bottom of the hopper through which the dry mixture is forced by compressed air, and a specially constructed nozzle at the end of the hose to which another hose supplying water is attached for hydrating the material. A diagram of the gun is shown in Fig. 1 and its working will be explained in detail later.

In the Cement Gun process, the dry materials are forced through the hose by means of compressed air, hydrated at the nozzle and shot into place with a muzzle velocity corresponding to a pressure of 35 pounds per sq. in. The resulting product is of a quality never before attained by hand or any other machine process. The combinations of the elements, cement and water, necessary to produce the plastic material, takes place in transit, and the latter is not disturbed after it is placed.

It is a well known chemical fact that the instant water is brought into contact with cement, the initial set, or chemical combination begins. The initial set must be looked upon as the commencement of that

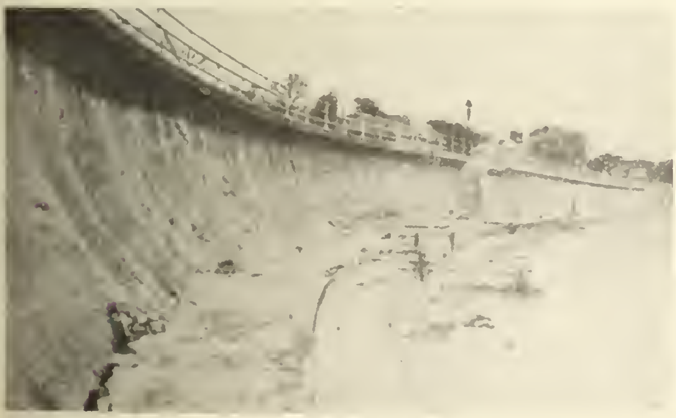


Fig. 2.—Sea wall at Lynn, Mass., showing destructive work of tides and storms.

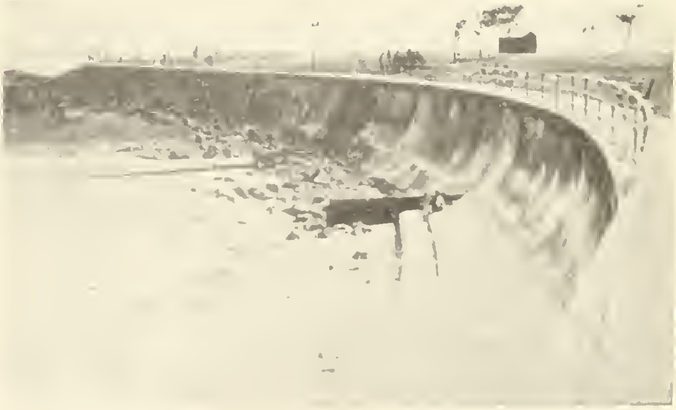


Fig. 3.—The same sea wall patched and repaired by the cement gun.

hardening which gives the mass its ultimate strength. Hence, subsequent manipulation or handling tends to disturb this initial set, and, consequently, must weaken the product. These objectionable features are entirely overcome by the Cement Gun process;—the hydration taking place in transit and immediately before and during emplacement, and the chemical combination or initial set taking place where it belongs; i.e., in its final resting place and not on the mixing board.

The Cement Gun employs only the necessary amount of water for the hydration of the cement, and because the materials are projected with considerable force, all surplus water and air are expelled. The product is a non-porous, impermeable mass, possessing the maxium density, which, by reason of these qualities, is practically waterproof.

These claims are substantiated by the results of certain tests made by the engineering firm of Westinghouse, Church, Kerr & Co. The conclusions as given in their report are given in full in the Appendix for the benefit of those who are specially interested.

That the remarkable results attained thus far are possible may be explained as follows: Consider for a moment the constitution of an ideal concrete. We will assume that that part of the mass, consisting of broken stone and sand, is so proportioned, relatively to size and fineness, that it contains the least possible percentage of voids. An ideal mixture would result if cement in sufficient quantity were added, to completely fill every void, to perfectly surround and cover each stone and each particle of sand, so that no two surfaces of either sand or stone, throughout the entire mass were in direct contact. Thus graded, and with the use of no more water than the amount actually required for the perfect hydration of the cement, the mixture would constitute the ideal concrete.

The Sand Blast as an Illustration

While it is obvious that, practically, it is not possible to obtain such a result by mixing the ingredients in bulk, either by hand or by mechanical means, the conditions prevailing when the Cement Gun is used are reversed, as may be understood from the following simple explanation.

We are all familiar with the Sand Blast: a powerful current of air into which, at some point prior to its escape at the nozzle, sharp, clean sand is introduced. The escaping current of air imparts a high velocity to the particles of sand as they leave the nozzle, the force exerted being sufficient to cause them to quickly wear away any hard, unyielding substance against which the blast may be directed, such as iron castings, stone, etc. If, instead of being projected against a hard substance, a sand blast is directed against a surface of a comparatively soft and sticky nature such as ordinary wax, a very curious and unexpected thing happens: it will be observed that the particles of sand, instead of instantly tearing and wearing the wax away, as might be expected, penetrate the surface and stick, thus becoming a part of the mass itself. This process is continued until the wax is, as it were, saturated, and no more sand can find lodgment therein: in other words, the wax, arms itself against attack with the sand itself, and thus the most powerful sand blast is rendered harmless.

Let us now consider what might be expected to happen if a certain proportion of powdered wax were introduced into the air blast with the sand, and the combined material directed against some hard surface, a sheet of boiler iron, for instance. Of course, the first particles of sand would strike the iron and bounce off, much as a pebble does when thrown against a wall, but, being soft and sticky, every atom of wax would adhere, and within a few minutes the entire surface of the iron would be protected by a thin coating of wax. After this coating had become thick enough to enable the grains of sand to embed themselves therein, they would cease to bounce off as at first, but would stick and become a part of the mass or casting itself. It is easy to understand that, if the process were continued, the sand and wax could be made to form as thick a coating on the surface of the iron as might be desired. If in the above experiment in place of the wax we introduce cement and water, the operation of the Cement Gun is easily comprehended.

Before leaving this part of the subject, it is essential to remember one important point, which is that when the nozzle is first directed against any hard surface, the particles of sand do not first adhere; they fall away until a coating of cement sufficiently thick is formed to enable the sand to embed itself. The importance of this feature will be better understood when it is realized that the effect in practice is to deposit a thin layer of practically neat cement, where the new work joins the old, and after hardening, if a test piece is broken, it will be found that this joint or initial surface of adhesion is the strongest part of the mass.

When considering "Gun" made concrete, it should be borne in mind that the powerful air blast imparts a great velocity to the particles of sand. By means of the sand blast, ordinary dry sand will wear its way through iron or steel with incredible speed. In the Cement Gun the high velocity imparted to the mixture of sand, cement and water as it is thrown upon a surface to be coated is of the utmost importance in producing a concrete of maximum density, as will be explained further on.

It was shown before that to secure the strongest concrete a given cement is capable of producing, water, sufficient only for the actual hydration of the cement contents should be added, because any surplus water which may remain weakens the mass by creating voids.

Cement Gun Process

In the Cement Gun, as explained previously, the sand and cement are first mixed together in correct proportion while dry. This dry compound is deposited in the hopper, from which it is fed into a powerful blast of air which conducts it through a suitable length of ordinary rubber hose until the nozzle is reached. Here, in the form of a fine spray, the water necessary for hydration is added at a pressure slightly in excess of the air pressure. The velocity with which the materials are travelling; however, is so great—300 feet per second—that hydration in reality takes place in the air, after leaving the nozzle, and is completed as the mixture is deposited. It is, of course, impossible to regulate the water thus admitted, to precisely the amount theoretically required, as a very small variation in the air pressure alters the amount of dry material flowing from the machine, nor is such fine adjustment necessary or advisable. The mixture of sand, cement and water strikes the object or surface on which it is deposited with such force, that any surplus water contained is continually driven to the surface and flows away, just as in tamping and ramming a mass of wet concrete, a percentage of the surplus moisture is forced to the surface.

It is admitted that concrete masses are weakened by voids. In concrete deposited by this machine there are practically no voids, as the same velocity which serves to drive away surplus moisture also makes the concrete compact and expels every bubble of air as well, and the resultant mass thus compressed and free from voids is as solid as natural stone.

In discussing the ideal concrete, attention was called to the importance of incorporating the cement with the aggregate, so that no two faces of sand or stone would be in direct contact, but separated always by a minute portion of cement, thus binding each particle of the mass to the other particles surrounding it. In concrete made by the Cement Gun, such conditions must prevail, otherwise the sand and particles of stone, lacking anything to bind them in place, would fall to the ground. Therefore, it will be seen that concrete thus laid is as it were self-selective. It cannot contain too much water, as any surplus is squeezed out by compression, and, necessarily, the mass is perfectly proportioned and mixed, and voids are reduced to an insignificant quantity.

Employed Successfully on Important Engineering Works

The Cement Gun has been used on a number of engineering projects very successfully. Probably the most prominent place where the Gun has been used is the Panama Canal. Here it was employed to coat the disintegrating rock of the Culebra cut with concrete.

The New York Central & Hudson River R. R. Co. are using the Cement Gun process for coating the steel work in their new 42nd Street terminal. This work has been done without forms, or centering of any kind, and a coating of two to three inches of concrete has been applied to all structural members. It is necessary that steel be thoroughly clean and free from rust. On account of vibration from trains, the concrete is reinforced with various sizes of wire mesh.

The Dover Street Bridge in Boston was repaired by means of the Gun Process. Here it was necessary to contend with tides, and it was found that concrete placed with the gun was unaffected by the tides, after it had been in place three or four hours. In experimental work, a hose has been turned upon Cement Gun work after being allowed to stand two and one-half hours, and it was unaffected.

The sea wall at Lynn, Mass., was repaired by Mr. J. R. Rablin, Chief Engineer of the Metropolitan Park Commission, in a very satisfactory manner by means of a Cement Gun. This work is shown in Figs. 2 and 3. Here, also it was necessary to contend with the tides, but it was found that they had no effect when the cement was once in place.

The engineers of the Water Supply Department of the City of Baltimore have investigated the Cement Gun Process and have decided that it could be used to advantage for lining an 8-mile brick water tunnel, between the new dam at Loch Raven and the City of Baltimore. This tunnel is being changed from a gravity tunnel to a pressure tunnel. This work, however, will not be done until next spring. In the case of this water tunnel, it will be necessary to work four hours and allow the concrete to set during four hours, and then turn the water on.

Sufficient data has not been obtained at the present time to make a very comprehensive statement in regard to comparative costs. We might state, however, that the cost already obtained compares very favorably with hand work, with a few exceptions. The most noticeable saving was in the Panama Canal work, where the wall put in by hand was level on top, and varied in thickness from four inches to four feet. The cost of labor and material alone, on this work, was $3.89 per square yard of surface covered. The labor and material cost for covering a square yard by means of the Cement Gun process to an average thickness of two inches was about $0.50. This, of course, was an exceptional case and the same results would not necessarily follow on other work. Old houses have been coated with stucco, for about the cost of painting them twice. New houses have been built at a cost below the best hand work, even though the resulting quality has been better than that secured by the former.

We have thus seen that not only have we now an apparatus which enables us to deposit concrete in various ways not hitherto found practicable, but also with the same apparatus we can obtain a concrete which has qualities and properties not secured with the best hand or machine made mixtures.

Whereas formerly, concrete layers less than a few inches thick could be deposited only by means of slow, laborious and costly methods, either by plastering, or, if space allowed, by means of comparatively expensive molds or forms, the same result may be accomplished with great rapidity and with the most flexible of tools, —a blast of air. Again, while with hand plastering it is practically impossible to secure a uniform deposit that will resist the forces of nature which tend to destroy the continuity of such a coating from the moment it is made, the concrete deposited through the agency of one of those destructive elements itself is so homogeneous, dense, and cohesive that even the flames cannot destroy its continuity.

DISCUSSION

Following the presentation of the above paper an interesting discussion took place among the members of the American Society of Engineering Contractors. The replies given to some of the queries are particularly illuminating as to the processes and possibilities of the cement gun and we have prepared the following extracts of points of special interest to readers of the Contract Record:

How much material does the gun hold, and how do you mix the sand and cement?

Mr. Jordan: The gun holds about three cubic feet, its capacity is about 10½ to 12 tons of material in eight hours, and the materials are mixed by hand or with a machine before they go into the gun. In a large operation we have used a mortar mixer. It is necessary to thoroughly mix and screen the material otherwise foreign matter gets into the feed wheel and chokes it up. The men who put in the material are ordinary laborers, but the man at the nozzle must be experienced.

What kind of hose do you use?

Mr. Jordan: We use a good quality of rubber hose, and we find that it will last about thirty-six days. The wearing out of the hose is due to the dry cement and sand forced through by the air pressure. It is one of the most expensive parts of the process. We have tried metal hose, but so far have found that a good grade of rubber is the only thing that will last. Metal nozzles wore out very rapidly. We tried steel, bronze and different metals without success,

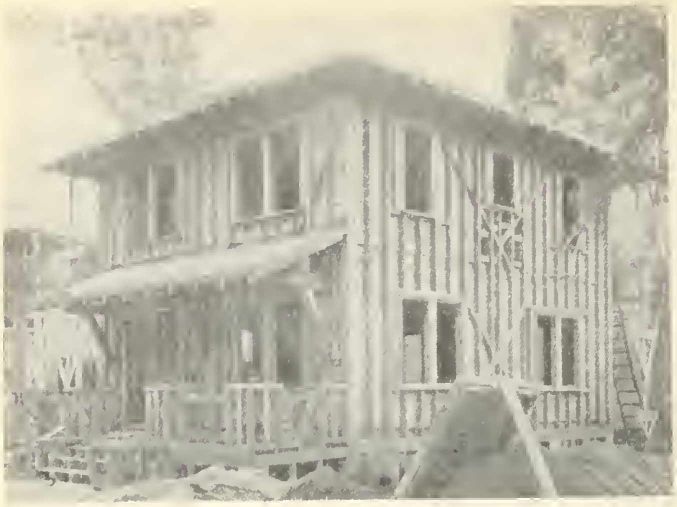


Fig. 4.—Wooden frame house designed to be covered with stucco, applied by the cement gun process. Wooden lath and hand-plastered on the inside.

until finally a United States Army officer at Panama invented a rubber lining which he put inside of the nozzle and discovered that the nozzle was preserved and lasted far beyond what it did when the lining was not in there. Every nozzle used has now a rubber lining made of the best quality of rubber that can be obtained; and that has thus far proved to be the cheapest.

What is the coarsest material you can use?

Mr. Jordan: Buckwheat or limestone screenings in the finished work, to give a pebble dash on the house. Guns can be designed to use a larger aggregate than that, but up to the present time that is the largest we have used.

One simple and cheap method of constructing a Cement Gun house is to first assemble the frame of the house. That is the first stage in Fig. 4, which is done very rapidly and economically; it is just a shell. We then cover that frame work with building paper and reinforcing wire or mesh which are placed directly over the studding; there is no sheathing, or anything else between the building paper and wire and the scantling. The house then appears as in Fig. 5.

The next step in the operation is to coat this house over with a first coat of Gun work. That is simply squirted on and this layer is only about one-half inch thick; the force with which it is deposited causes the mortar to crowd on the tar paper so that the reinforcing wire lays on the surface of the first half inch coat. Then the second application, made after the first coat is hard causes the wire to be located in the middle of the whole coating and seems to reinforce it. The windows are covered with cloth, and where it is necessary to protect the sills or other parts of wood work the same are simply brushed over with crude oil and the gun mortar will not stick thereto. Fig. 6 shows the finished house. The contract price was, approximately, $1.35 per square yard, including the paper, the wire and the cement, also the temporary canvas over the windows.

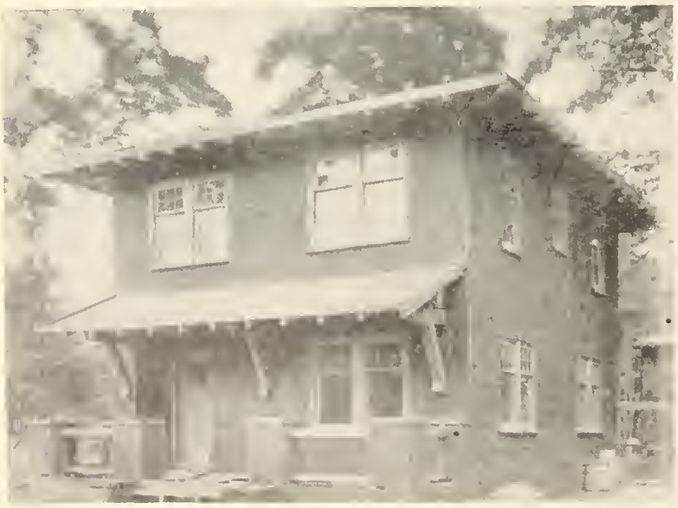


Fig. 5.—Second stage in the cement gun process. The above frame covered with building paper and reinforcing wire.

On these particular houses we had a bid from a hand stucco worker for the same work, and he wanted $1.89 a yard, including the sheathing, the metal lath, and seven-eighths of an inch coating of first-class three to one mortar on the outside, guaranteed to stay on.

Did you use a proportion of hydrated lime in that stucco?

Mr. Jordan: We used as high as 20 per cent. The mixture seems to go through the gun better and lubricates the mechanism; it carries more sand, and less of it drops off the wall as is the case with just sand and cement. We know that it diminishes the number of voids in the material and thus tends to waterproof the house, which is very essential, and at the same time gives a sort of flexibility to the concrete thereby preventing surface cracking. The lime is also cheaper than cement. There are a number of good reasons for the use of hydrated lime in the mixture which is composed of about 85 per cent. cement and 15 per cent. hydrated lime, to three parts of sand. It can be made any color.

Have you tried any waterproofing powders?

Mr. Jordan: We have not found it necessary in this case. We have used "Alca" lime to make the surface white. As I have shown, we have found that the product of the Gun is so dense and free from voids that it is water-tight under ordinary conditions.

Was the Cement Gun used to do the plastering on the inside of the house as well?

Mr. Jordan: This particular gun is not adapted to inside plastering. There has been developed in Germany in the last year a cement gun which is used for inside plastering, and, I understand, very successfully.

Has any ornamental stucco been done?

Mr. Jordan: Thus far, we have attempted only ordinary work. As explained before, the cost of gun work increases rapidly when applied to building up ornamental details such as pilasters, ballustrades, etc.

Have you made any experiments with the Gun for laying cement sidewalks?

Mr. Jordan: We have not experimented extensively, but we have built about 5,000 square feet of sidewalks. The finish of the gun leaves the top rough which, of course, is an advantage for walks. The rough surface is very much better than the smooth, slippery concrete sidewalks as ordinarily built.

Would it be more expensive than Granolithic finish?

Mr. Jordan: I think that it should be cheaper as the mortar can be built up more rapidly. There is still room for a great deal of developing to be done before the gun can be considered satisfactory for sidewalk and road work.

In connection with fireproofing work, how does the Cement Gun compare with the ordinary fireproofing? Take, for instance, the New York Central fireproofing. How much more expensive would this be compared with the ordinary stone concrete?

Mr. Jordan: In the case of the New York Central the work by the gun is very much more economical than the other work, because no forms are used. On some of these girders it would be practically impossible to set up the forms. The cement gun coating is applied there to steel work that has three coats of paint, and the reinforcing wire is depended on to hold the cement in place and to secure it against vibration. The thickness of the coating is about two inches.

Do you use any preliminary treatment in cleaning off the surface before the blowing on of the cement?

Mr. Jordan: We use first a blast of air directly through the machine before the sand and cement are put in, to clean off the surface. In the case of brick walls or terra cotta they are washed down with water from the hose. By blowing sand through the machine it may be used as a sand blast.

Have you had any experience in putting on the cement in cold weather?

Mr. Jordan: We have had no trouble if we put on only one layer, but we can not put on two coats in freezing weather.

A Member: I used a gun in Delaware and while witnessing a test some of the men present were quite interested to know how heavy a body of stone would be penetrated by the filling. We had a section ten feet square laid off in an old building, and filled it with six and a half inches of stone at the top of the form. I then had one of the laborers take some fine stone screenings and place on top of the stone in one corner. We then blew or squirted the mortar on top of that, and after the material was dug up we found that the Cement Gun had driven the mortar clear through the two and a half inches of stone screenings into the bottom layer of the broken stone, and the result was a very compact concrete. You can judge from that the penetrating power it has. Every void was thoroughly filled.

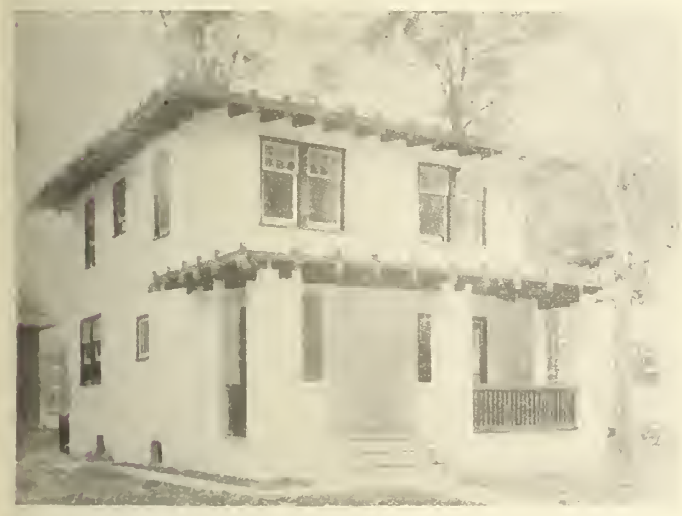


Fig. 6.—The finished concrete house as left by the cement gun. No hand work necessary to complete work.

A Member: This machine has, undoubtedly, a great range of possibilities, particularly as to its adaptability for filling in the crown of an arch in a sewer or tunnel. It is very easy in a reinforced concrete job to place concrete in the bottom and sides, but when it comes to the three feet at the top it is a very hard place for a man to work, especially if there is any reinforcement there. With a gun that material should be placed rapidly and effectively.

Mr. Jordan: There is still much to be learned in regard to it. The costs on various kinds of work have not been reduced to a point that will be reached after further practice and with proper and efficient management, and the training of the nozzle-men and crews. There has not been sufficient work of the same class to give us a fair average.

On hollow tile or on concrete blocks, coatings ⅜ to ½ inch thick can be put on very rapidly and economically in competition with hand stucco work at a very good profit. On old houses we figure mostly in competition with painting. The owner knows that his house requires painting; he also knows that this should be done every two years. In the meantime the wood is rotting and deteriorating. Cement coatings ⅜ to ⅞ of an inch thick can be applied to a house and, as stated previously, the cost will be less than painting the house twice. It is simply an investment from his standpoint; moreover, it frequently increases the value of the house.

C. P. R. Construction Programme for Ontario

The Canadian Pacific Railroad programme in Ontario for 1912 will mean the construction of an aggregate of over 450 miles of railway. This company will build a section of the alternate Toronto-Montreal route, from Belleville to Toronto, passing the lakeshore towns of Trenton, Brighton, Colborne, Grafton, Cobourg, Port Hope, Bowmanville, Oshawa, and Whitby.

Other projected lines are from Hamilton to St. Catharines, Welland, and Port Colborne. A third one will be a line from Ingersoll north, connecting with the Port Burwell branch and the St. Thomas branch, passing through Embro, Tavistock, and Shakespeare, connecting with the company's Goderich, Guelph, and Listowel lines at Linwood, then on to Arthur, where connection is made with the Teeswater and Mount Forest and Wingham lines, crossing the Owen Sound lines in the vicinity of Dundalk and terminating at Collingwood. The company intends extending the lines now stopping at St. Marys to the shore of Lake Huron, and passing through Exeter, possibly to Sarnia. Another proposed line is from St. Marys to connect with the Goderich line near Goderich, which will pass through Mitchell, Dublin, and Seaforth. These proposed lines aggregate over 450 miles, and their construction will give splendid additional transportation facilities to the central and western portions of Ontario.

A pamphlet descriptive of the Stereophagus Pump and Special System of Pumping has been forwarded to us by the Hon. R. C. Parsons, 39 Victoria street, London, Eng. In a prefatory note, the author (Hon. R. C. Parsons) explains that it is his endeavor in this booklet to show that it is possible to install systems of drainage in flat districts, where the sewage requires to be pumped, at a cost considerably less than that which has been experienced hitherto, and thus improve the sanitary conditions of those localities. This pump and the sewerage system described in the booklet, supplemented by the illustrations given, have occupied the attention of the author for many years. He has had extended experience in various parts of the world and this special form of centrifugal pump, the "Stereophagus" or "Eater of Solids," has followed much experimental work and patient endeavor. Exhaustive tests have been carried out with this pump. It has passed water containing large quantities of cotton waste, wood shavings, ropes, rags, pieces of wood, dead animals, etc., without becoming blocked, and is claimed to be as efficient in the power required to drive it as a centrifugal pump of the ordinary type.

A careful enquiry has been made with regard to the orders placed all over the world, with the exception of the United States, for refuse destructors, during the year 1911, with the result that so far as can be ascertained 81 per cent. in value of the orders placed were received by Messrs. Heenan & Froude, of Manchester, Eng. If the figures for the United States were added, it is probable that this percentage would be greatly increased, as some very large orders have been placed in the United States for Heenan & Froude destructors during the year.

Wages on Government Contracts

.. Some details of wages paid on recent Government contracts are given in the January issue of the Labor Gazette. From the particulars given we extract the following:

Fair Wages Clauses

All mechanics, laborers or other persons who perform labor in the construction of the work hereby contracted for shall be paid such wages as are generally accepted as current for competent workmen in the district in which the work is being performed, and if there is no current rate in such district, then a fair and reasonable rate, and shall not be required to work for longer hours than those fixed by the custom of the trade in the district where the work is carried on, except for the protection of life or property or in case of other emergencies. In the event of a dispute arising as to what is the current or a fair and reasonable rate of wages, or what are the current hours fixed by the custom of the trade, it shall be determined by the Minister of Labor, whose decision shall be final.

In the event of default being made in payment of any money owing in respect of wages of any mechanic, laborer or other person employed on the said work, and if a claim therefor is filed in the office of the Minister of Public Works, and proof thereof satisfactory to the Minister is furnished, the said Minister may pay such claim out of any moneys at any time payable by His Majesty under said contract, and the amounts so paid shall be deemed payments to the contractor.

Public Building at Port Perry, Ont.

Public building at Port Perry, Ont. Name of contractor, W. J. Trick, Oshawa, Ont. Date of contract, November 29, 1911. Amount of contract, $22,475.

Trade or Class of Labor	Rate of Wages Not less than the following:
Stonecutters	$3.50 per day of 10 hours
Bricklayers	3.50 “ 9 “
Masons	3.50 “ 9 “
Carpenters	2.25 “ 10 “
Plasterers	3.50 “ 9 “
Painters and glaziers	2.00 “ 10 “
Plumbers and steamfitters	2.25 “ 10 “
Sheet metal workers	2.25 “ 10 “
Electrical workers	2.25 “ 10 “
Builders' laborers..	1.75 “ 10 “
Common laborers	1.50 “ 10 “
Driver with 1 horse and cart..	2.50 “ 10 “
Driver with 2 horses and wagon	3.50 “ 10 “
Structural steel workers	None

Construction of two Cribwork Ice-breakers, Aylmer, Que.

Construction of two cribwork ice-breakers at Aylmer, Que. Name of contractor, Thomas and J. Moran, Arnprior, Ont. Date of contract, December 7, 1911. Amount of contract, $1,451.

Trade or Class of Labor	Rate of Wages Not less than the following:
Foreman carpenter.	$3.50 per day of 10 hours
Masons..	3.50 “ 10 “
Carpenters	2.50 “ 10 “
Painters	2.50 “ 10 “
Skilful laborers	2.00 “ 10 “
Ordinary laborers	1.75 “ 10 “
Driver with 1 horse and cart ...	2.50 “ 10 “
Driver with 2 hores aand wagon	4.00 “ 10 “

Wharfs at St. John West, N.B.

Wharfs at St. John, N.B. Name of contractor, Michael Connolly, Montreal, Que. Date of contract, December 12, 1911. Amount of contract, $760,285.

Trade or Class of Labor	Rate of Wages Not less than the following:
Foreman carpenter .....$ 3.50	per day of 9 hours
Foreman mixing concrete 2.50	“ 9 “
Foreman laying concrete 3.50	“ 9 “
Foreman stone crusher .. 2.50	“ 9 “
Engineman for pile-driver 2.50	“ 9 “
Steam derrick engineer.. 2.50	“ 9 “
Steam derrick fireman .. 1.75	“ 9 “
Carpenters.. ... ... 3.00	“ 9 “
Blacksmiths.. ... ... 2.50	“ 9 “
Blacksmiths helpers 1.80	“ 9 “
Dredge runner 125.00	per mo. with board, 10 h.p.d.
Dredge engineer 125.00	“ “ 10 “
Dredge fireman 125.00	“ “ 10 “
Scowman 45.00	“ “ 10 “
Deckhands 35.00	“ “ 10 “
Cook 35.00	“ “ 10 “
Craneman 85.00	“ “ 10 “
Tug captain 70.00	“ “ 10 “
Tug engineer 60.00	“ “ 10 “
Tug fireman 45.00	“ “ 10 “
Steam drillers 2.00	per day of 9 hours
Hand drillers 2.00	“ 9 “
Powderman 2.00	“ 9 “
Builders' laborers. 2.00	“ 9 “
Ordinary laborers 1.75	“ 9 “
Driver, 1 horse and cart. 3.00	“ 9 “
Driver, 2 horses & wagon 5.00	“ 9 “
Divers with outfit 15.00	according to tide.

Immigration Shed, Quebec

Immigration shed, Princess Louise Embankment, Quebec, Que. Name of contractor, C. E. Deakin, Montreal, Que. Date of contract, December 15, 1911. Amount of contract, $348,000.

Trade or Class of Labor	Rate of Wages Not less than the following:
Carpenters	$2.50 per day of 9 hours
Stonecutters	0.40 per hour, 8 hours per day
Bricklayers	0.50 per hour, 8 hours per day
Masons	0.40 per hour, 9 hours per day
Plasterers	0.40 per hour, 9 hours per day
Painters	0.30 per hour, 9 hours per day
Plumbers and steamfitters ..	0.28½ hour, 9 hours per day
Sheet metal workers	0.28½ hour, 9 hours per day
Electricians	0.22½ hour, 9 hours per day
Builders' laborers..	2.00 per day of 9 hours
Common laborers..	0.17½ hour, 9 hours per day
Driver with 1 horse and cart	2.00 per day of 9 hours
Driver, 2 horses and wagon.	4.50 per day of 9 hours

Marine Department Contracts, British Columbia

The construction of two wooden echo boards, on the North side of the first Narrows of Burrard Inlet, B.C. Name of contractor, Thomas Stedham, Victoria, B.C. Amount of contract, $1,845.00. Date of contract, 5th December, 1911.

Trade or Class of Labor	Rate of Wages Not less than the following:
Carpenters..	53⅛ cents per hour, 8 hours per day
Painters.	56¼ cents per hour, 8 hours per day
Plasterers..	75 cents per hour, 8 hours per day
Pile-driver workman	35 cents per hour, 8 hours per day
Common laborers ..	35 cents per hour, 8 hours per day

Approved Methods of Winter Concreting

Precautions which, properly carried out, Ensure Satisfactory Work in Freezing Weather and Prevent Unnecessary Delays

By Jerome Cochran, Designing Engineer Trussed Concrete Steel Company, Detroit, Mich.

(Concluded from last issue)

Even if the concrete materials are heated as previously described great precautions must be taken to properly cover up the concrete when it is placed, in order to prevent subsequent freezing.

Any concrete liable to be exposed to rain, frost or snow, before it has attained its permanent set, should be temporarily protected by a layer of boards, leaving an air space of at least four inches, and laying tar paper or tarpaulins over the boards. The edges of the tar paper or tarpaulins should be brought down to enclose the air space. No concreting in cool weather should be commenced unless the required quantity of tar paper or tarpaulin are at the site.

Heated concrete should invariably be protected by suitable covering to insure the concrete setting before it has cooled to a freezing temperature. The concrete work must be covered before stopping work at night, even though it is warm during the day time, as the nights are often below freezing temperature. A remarkable drop in temperature occurred at Indianapolis, Ind., on the night of November 11, 1911, according to the records of the Weather Bureau. During that day the temperature rose from 51 deg. to 73 deg. and that night the temperature dropped to 14 deg. and the next day was bitterly cold.

Work to be placed upon concrete laid in freezing weather should be delayed until the setting of the cement makes the mass sufficiently stable to carry the weight, as heavy pressure tends to retard the setting. Usually as much as forty-eight hours or more should be required before masonry or other weights are laid upon the concrete.

All reinforced concrete should be kept at a temperature above freezing for at least forty-eight hours after being put in place.

The use of manure should not be allowed for the covering of concrete, as it causes disintegration, unless the concrete is well and sufficiently covered so as to be waterproof against the drainage therefrom. If stable manure can be kept in place in sufficient quantities to keep its fermentation it is the most efficient material for covering. In no case should fresh manure be placed over very green concrete to protect it from freezing, as it will spoil the surface of the concrete. The manure may be placed on the tar paper or tarpaulins on top of the boards, as described above.

A covering of straw or hay may be allowed only on certain conditions.

In building construction, the reinforced concrete must be kept from freezing and maintained at a fairly high temperature to permit proper hardening. Encase the building with canvas and place salamanders under the floor being concreted. Coke should be burned when it is readily obtainable. This heating should be continued for several days and the concrete should then be examined. If found to be in good condition, properly set, and with no evidence of having been frosted, the salamanders may be removed; but the covering should be left in place for, at least, another week.

Forms may also be so constructed as to protect all parts of the concrete from injury by frost, radiators or live steam being used within the form sufficient to keep the temperature above 35 deg. F. during, and for at least two days after, the placing of concrete.

Care must be taken to see that the concrete and the forms are not allowed to dry out when salamanders or other artificial heaters are used to keep the work warm. Moisture is very essential to the proper setting of concrete, and the loss due to evaporation from concrete and forms by drying heat must be replaced by sprinkling or other means.

For a spaded or mortar finish, extreme care should be taken to protect the work, preferably by covering the outside of the forms with a layer of tar paper so as to leave an air space between it and the face lagging. Tests have shown a difference in temperature of 15 deg. F. between the air in the air space and the outside atmosphere. Care should be taken to tack this paper on securely. Structures in which the surface finish is important must not be permitted to freeze until the concrete is well set. Blocks of the lagging, (say) 4 x 12 inches, at different points of the most exposed sides of the work, may be cut out, in order to note whether or not the mortar facing is being affected by frost.

Special pains should be taken to protect the north and west side of the structure. Canvass curtains may be hung on the north and west sides of the building to keep out the wind.

Removal of Forms

The most important precaution, and one whose importance can not be over-estimated, is caution in the removal of the formwork.

All forms under concrete placed in freezing weather should remain until the season has advanced beyond the probability of a frost. If earlier removal of forms is permitted, they should remain until all evidences of frost are absent from the concrete and the natural hardening of the concrete has proceeded to the point of safety. Forms for such work should be kept in place at least two weeks longer than customary. Special care must be used in removing centering when the concreting has been done in cold weather.

False work must never be removed while the concrete is frozen. If necessary, artificial heat must be employed to thaw the whole mass and the set and hardness determined before removing falsework. In other words, don't remove any forms until absolutely certain that the concrete is thoroughly hardened and that no portion is either soft or frozen. The only sure way of knowing when the cement is fully set and the concrete properly hardened, is to actually test it with a hammer for hardness. To do this, it is necessary to remove small portions of the formwork in each section of the structure to be certain that there are no soft spots.

The forms must be removed very carefully and without shock to the structure. Always leave in place a few intermediate posts so as not to place the entire dead weight too suddenly on the beams and columns. A regular procedure should be followed in removing forms, and the work should be done by regular gangs so that the men become trained in the requirements and methods of the work. Care must be exercised and precautions taken to prevent large masses of forms from falling on floors. Prying with bare bars or striking with a sledge must not be allowed, as all jar and vibration must be avoided.

A competent and experienced foreman should be in charge of the removal of forms at all times. At no time are more men to be engaged in the striking of forms than the foreman can fully direct and supervise. No foreman lacking the required experience in this line on high-grade work should be allowed upon the work.

Forms are removed from the concrete at the contractor's risk at any time, and more especially during the winter months, and should any of the concrete give way by such removal or become permanently injured, the contractor should be required to remedy same at his own expense. The contractors should be expected by suitable observation to know when the concrete in any section of the work is sufficiently hardened to bear its own dead load plus additional load as may be imposed by the work of installation and should not by any means be relieved of responsibility for premature removal of centers. The engineer's acquiesence in permitting removal of forms should not relieve the contractor of responsibility for same.

No exact time for the removal of forms can be safely prescribed because of the varying character of the work, the variations in the setting of different cements and the influence of atmospheric conditions. Forms should, however, remain longer under beams and arches than around columns or walls, and longer under beams and arches of long spans than of short spans.

Conclusions

Cold weather and lack of proper appreciation of guarding against its dangers, are fundamentally responsible for practically all failures in concrete work. Engineeers should, therefore, take most special care in the inspection of the work, and thoroughly familiarize the contractor with the additional cautions that must be taken to successfully place concrete in freezing weather. Very few accidents, indeed, are due to improper design, and nine-tenths are due to lack of proper inspection. Every concrete building of importance should have an inspector on the work continually.

Horizontal adjustment for anchor bolts for the steel bents in the towers of the plate girder viaduct of the St. Croix River Bridge of the Minnesota, St. Paul & Sault Ste. Marie Railway was provided by setting the bolts in conical holes. In each concrete pedestal there is a single eccentric 2½-in. vertical anchor bolt about 9 ft. long. The nut on the lower end engages the bottom flange of a horizontal reaction beam 2 ft. long, made of a pair of 8 x 8-in. angles, and at the upper end engages a round hole in the bottom of the tower posts. The bolts were built into the pier concrete, but before the latter was placed they were enclosed in full length No. 22 gauge back iron cones 8 in. in diameter at the top and 2½ in. in diameter at the bottom. These provide a sufficient clearance for the bolts to be moved in any direction at the top to receive the tower post and provide for any irregularities of construction. After the posts were erected the holes in the pier concrete were filled with grout, thus fixing the bolts rigidly in their final positions and protecting them against corrosion.

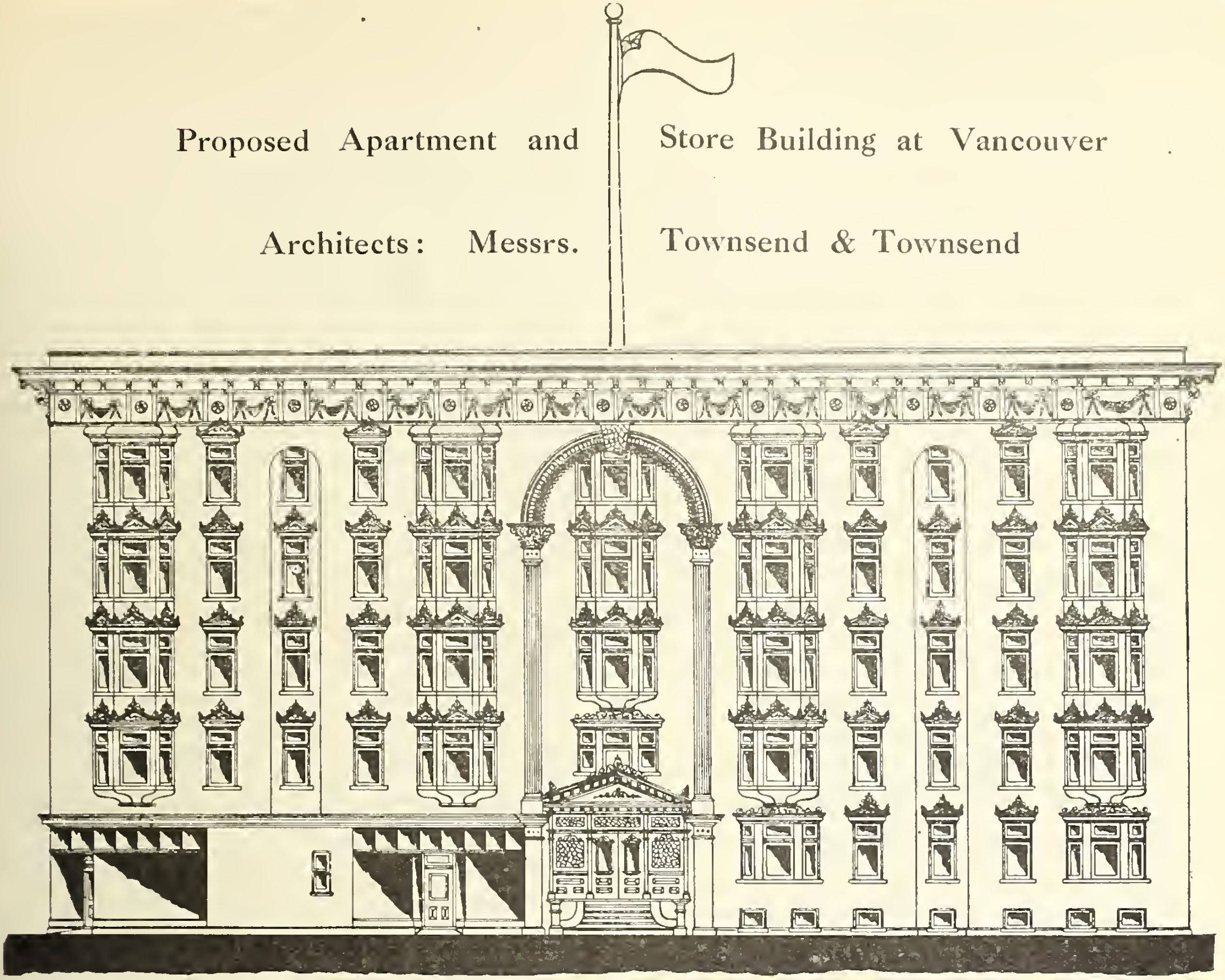
Economies in reclaiming railroad scrap, as practised by the Lake Shore & Michigan Southern Railway, are outlined by Mr. J. P. Murphy in a recent paper before the Central Railway Club. All bolts and iron suitable for making bolts are assorted, straightened, cut to length, threaded and returned to stock. Washers are made from old sheet metal on a punch, and nuts are sorted to size and re-tapped. Track spikes and bolts good enough for further service are returned, and tie plates, angle bars and rail braces are sorted and straightened, the plates being often repunched to new sizes. Old bridge channels and angles are made into angle-iron face plates for cars. Frogs and switch parts are dismantled, the good parts being assembled for use in the manufacture of new frogs and switches in the rail shops. In handling scrap, it is sorted for mill classification in such a way as to enable the purchasing agent to obtain better prices for it.

Quite a little attention has recently been given in Germany to experimentation in the direction of methods and means for rendering walls and ceilings capable of effective resistance to sound transmission. One of the more recently devised methods involves the use under the ceiling, or parallel to the wall, as the case may be, of a network of wire stretched tightly by means of pulleys secured into adjacent walls and not touching at any point the surface to be protected against sound. Upon the wire network is plastered a composition formed of strong glue, plaster-of-paris and granulated cork, so as to make a flat slab, between which and the wall or ceiling is a cushion of confined air. The method described is said to be good in two respects; first, the absence of contact between the protective and protected surfaces, and, second, the colloid nature of the composition recommended for the plaster.

Something less than a century ago there was a tax on building brick in England, and in order to evade it the brick were made of larger and larger sizes. These were used for cellars and other concealed places. To stop this fraud, says Brick, an act was passed in the reign of George III fixing the legal size of brick. Early in Queen Victoria's reign the tax was taken off, and brick may now be legally made of any size whatever, but any change from the standard size would bring about great inconvenience. All calculations for buildings are made on this standard size, and the London building acts have practically fixed it at 9 x 4½ x 3 in. for all time.

The best way to insure yourself against all possible chance of missing 1912's opportunity is to let the world know you are in line to meet it.

Mr. W. J. Harrington, of Waddell & Harrington, Kansas City, Was in Vancouver recently conferring with the officials of the C. N. R. relative to the construction of ten new steel bridges, for which his firm have obtained the contract. It is stated that the structures will involve an expenditure of $1,300,000.



Proposed Apartment and Store Building at Vancouver

Architects: Messrs. Townsend & Townsend

An Up-to-date Building at Vancouver

The above illustration shows an apartment and store building which is to be erected at Vancouver, B.C., at an estimated cost of $132,000. The architects ars Messrs. Townsend & Townsend, 520 Granville street, Vancouver. The building is to be of brick construction with stone trimmings. The basement and part of the first floor will be steel. A cafe will be located in the basement with tiled floors and hardwood finish. The main entrance court will have a tiled walk and fountain, while the entrance door and frame will be finished in hardwood and the steps in marble. Steam heating will be installed, together with the most approved plumbing and all modern conveniencies.

Licensing of Builders

In his annual report covering operations during the year 1911 John Thatcher, Superintendent of the Bureau of Buildings for the Borough of Brooklyn, N.Y., presents some pertinent suggestions touching the licensing of builders. He says:

It has been my constant endeavor to bring about better workmanship and the use of good and safe materials in the construction of what are termed "speculation" buildings. The major portion of all building in this borough come under this head. I would call attention, at this time, to the changed conditions existing in the building trade. In times past it was considered necessary that a builder should have a thorough knowledge of construction; commencing with an apprenticeship to the trade, and then followed by some years of experience as a journeyman, finally becoming a master builder, capable and able, of his own knowledge and skill, to put up buildings properly.

A positive danger exists here to-day in that a large number of buildings are being put up by men who know absolutely nothing about building construction, and whose sole purpose and aim is to make money by the use of the cheapest material and labor in the market. This results in buildings that will always be unprofitable to the purchaser, as the cost for maintenance will be sure to exceed any possible returns on the investment. This condition, in a large measure, could be prevented if a consistent law were enacted, requiring builders to pass an examination as to their fitness, and if fit, to be given a license before being allowed to build. This will have to be done very soon, as present conditions are dangerous and a positive menace to the public. The Bureau of Buildings can only hope, by constant vigilance, to secure present day safety of this class of buildings. The quality of workmanship is largely beyond control.

The present year will be the greatest in Canadian history so far as concerns railway development. In the four western provinces no less than sixty million dollars will be expended this summer. The lines to be built cover 3,000 miles. The only danger ahead is the difficulty of securing men. It is estimated that 60,000 laborers will be required.

Annual Meeting of the American Society of Engineering-Contractors

The Third Annual Meeting of the American Society of Engineering Contractors was held in New York City on the 9th day of January, 1912.

In the forenoon, members of the Society visited, in a body, the new Grand Central Terminal, at the invitation of Mr. W. L. Morse, Terminal Engineer of the New York Central & Hudson River Railway Company. They were escorted by Mr. E. D. Sabine, first assistant terminal engineer, Mr. W. C. Goddard, terminal architect's engineer, and their assistants. Great interest was evinced by the members who were fortunate enough to view the remarkable work accomplished and still going on. This work will result in probably the greatest railroad terminal in the world. Particular interest was manifested in the method of coating all the steel columns, beams, etc., in the lower level with cement. The mortar is applied directly through the "Cement Gun" by the agency of a blast of compressed air.

At the afternoon session, which was devoted to a business meeting, the address of the retiring President of the Society, Mr. W. R. Harris, was read. Mr. Harris, who for nearly one year has been located in the Canadian Northwest at Regina and Saskatoon, Sask., was unable to be present. He stated that even in those provinces much interest is evidenced regarding the work undertaken by this Society, which is about to be manifested by the organization of branches.

Compensation for Injuries

We read and hear much these days relative to workmen's compensation for injuries sustained. Undoubtedly, many superficial observers show little interest in this question unless directly affected in legislation of this character with the result that many laws have been passed which, if enforced, will be bound to affect seriously contractors and, ultimately, the public. It goes without saying that every added expense saddled on the contractor through such laws is not going to be assumed by him, but must be paid by the owner, whether he be an individual or the public.

Saskatchewan Procedure

Mr. Harris related that during the last session of the local Parliament in Saskatchewan a law was passed whereby all workmen except farm laborers are entitled to compensation for injuries, whether sustained through carelessness or not. This is class legislation of the worst kind, because the farmer, who employs the larger part of his force only a short time each year, is not affected, while the manufacturers and the contractor are liable. Furthermore, the law is unfair in its effect on the bids of various contractors. The man who is responsible, and, therefore, is able to obtain liability insurance, must pay the higher premiums caused by this act, and, necessarily, must include such cost in his bid. On the other hand, the contractor who, because he is not financially responsible, or for some other reason, does not secure such insurance, would not have to figure on such an additional expense and is thereby able to reduce his bid accordingly.

A point of interest to all engineers who have to specify tests for cement is one brought out by Mr. Harris, who stated that, under the present specifications, tests required for cement fail to provide the safeguards anticipated. For instance, while the usual method of taking one barrel in every ten of a shipment as a sample of the material, the method of mixing the samples is not satisfactory. It is provided that, to determine the characteristics of a shipment, the individual samples may be mixed and the average tested. This may not be objectionable where the cement is used in massive concrete subject to compression only. In reinforced concrete, however, because comparatively thin members are used, this method should not be allowed.

The reasons given by Mr. Harris for his position are as follows:

It is acknowledged that 80 per cent. good cement will carry 20 per cent. poor cement. If the average sample of a shipment shows only 20 per cent. bad material it is, according to standard specifications, allowable. However, the mixing which is done with the samples is, of course, not repeated with the bags of cement since it would be impracticable to take a car load shipment, mix it and remeasure it to secure the proper proportion.

The result is that where mixing up a batch of concrete, the sacks used may contain as much as 50 per cent. bad cement, and just as likely as not this concrete may be placed in a portion of a structure where only the best material should be used.

Again a shipment of cement may contain the products of different mills, cement which may be different in regard to setting time, fineness, etc. It is bad practice to use two brands of cement in the same concrete mixture, but if the products of several mills are placed in sacks of a common brand, it is impossible to tell by looking at the sack whether the contents of a car would run uniform or not, except by individual tests.

This question is of much importance to architects, engineers, contractors, and manufacturers of cement or cement products. Mr. Harris recommended concerted action by this Society with other technical societies to eliminate the foregoing defects of the present specifications.

After Mr. Harris' address was read, the result of the election of officers was declared. The following officers were elected: President,—Maj. C. E. Gillette, of Philadelphia, Pa.; 1st Vice-president,—H. J. Cole, of New York, N.Y.; 2nd Vice-president,—John Marshall of Regina, Sask.

President Gillette then assumed the chair and after some introductory remarks, called for a report of the treasurer, which was presented. This was followed by a report of the secretary, in which he outlined the work accomplished by the Society during the past year. Among other things, the secretary stated that 130 new members had been added to the rolls of the Society during 1911, an increase of 25 per cent. of the active membership. This was followed by discussions relative to various features of the work to be done by the Society, among which is the gathering of cost-data.

Cost Data

Mr. Shannon, of Jersey City, and Mr. Bosch of Harrisburg, both contractors, stated that, in their opinion, it could not be expected that contractors, generally, would care to divulge their costs since they usually consider this information as their personal property, or what may be called their trade secrets. Mr. Frank B. Gilbreth, the well known contractor, however, took the view that contractors are bound to benefit from interchange of ideas and publication of costs. He stated that if many of the contractors who bid on construction work only knew more about costs there would be less ruinous bidding than there is at the present time. It has been the experience of large manufacturers that they have benefited from the publication of their costs in full detail, by the fact that competitors could see for themselves that the margin of profit was not so large as to allow great risk to be taken. It was agreed, however, that cost-data has not much value unless together with it is given full details of the method of doing the work, the character of labor, hours of work and an explanation of all conditions that would affect the cost.

At the evening meeting the elected president, Major C. E. Gillette, delivered an interesting address in which he pointed out that the Society, although it is an association of contractors and engineers is, primarily, organized to do something for the public good. Major Gillette also pointed out that, whereas every class of labor or industry is organized, contractors alone are not. He stated that this Society should take steps to point out and eliminate waste in large works, waste which is often due to errors in design. Very few designs are made from the point of view of final cost, and in that respect much benefit should result from co-operation and interchange of ideas between engineers and contractors.

Another feature in contracting work, which causes the contractors great loss, and which, ultimately, affects the public, is unreasonable inspection. This requires attention, because unfair inspection has been the cause of much trouble in contract work.

The next point that the speaker referred to was the question of practical specifications. Only too often specifications are written that would require a miracle to carry out, in fact, they are an absolute impossibility; yet contractors are constantly asked to bid on such specifications and they must do it, if they want work. The result is that no end of trouble is experienced. Ultimately the cost must be shouldered by the public, who are powerless to prevent it.

The remainder of the evening was devoted to a talk by Mr. J. R. Wemlinger, on "Methods and Costs of Driving and Pulling Steel Sheet-Piling." This was illustrated by means of one hundred and twenty-five slides showing all known methods of installing sheet-piling of all kinds in United States and foreign countries.

The headquarters of the American Society of Engineering Contractors are at 13-21 Park Row, New York City.

Calgary Builders' Exchange

At the regular meeting of the Calgary Builders' Exchange held last week it was decided to send a number of delegates to the convention of the Provincial Association, which is to be held at Lethbridge this month.

A letter was read from the Deputy Attorney-General, stating that owing to pressure of business the amendments to the Lien Act might not be introduced at this session.

Much indignation was expressed by several members and it was unanimously decided that the original deputation be increased and return to Edmonton to urge the matter, in view of assurances given to bring forward the required legislation at this session.

During the evening the following new members were elected: Messrs. Johnston & Johnston, general contractors; G. J. Davis, contractor; McLaren Hardware Company; Polglase & Huster, lathing contractors; Archer Brothers & Srigley, general contractors.

The Garlock Packing Company, of Hamilton, Ont., specialists in engine packings, and sole manufacturers of Garlock packings and pipe coverings, have just issued an attractive and comprehensive catalogue containing an enumeration and description of their various lines. Garlock packings have become deservedly popular with mechanical men during the last quarter of a century and they need no introduction at our hands. The catalogue is particularly informative and covers a wide range of materials, all of which are claimed to be the standard of design, material and workmanship. The Garlock Packing Company have their head office and factory at Hamilton, with branches at Montreal, Toronto and Vancouver.

A new seven-storey building is to be erected on Pender street, Vancouver, at a cost of $250,000. Messrs. Horton & Phipps are the architects.

A Year's Work in the Engineer's Department at Calgary

According to the annual report of Mr. J. T. Child, City Engineer of Calgary, Alta., 1911 was the busiest year in the history of the city. This is attributable to recent additions of new territory and the great strides made by the city consequent upon the unbounded confidence in the future manifested by the investing public. In his introductory remarks Mr. Child points out that both his department and the contractor are frequently delayed owing to contracts not being signed early in the year. He suggests that all contracts be signed and that proper bonds be given before any contractor is allowed to commence operations.

During 1911 the Twelfth Avenue bridge and the Second Street East bridge were completed by contract. The contractor for the sub-structure was Mr. F. Fehrenbach, of Calgary, and for the superstructure, The Algoma Steel Bridge Company, of Winnipeg. The subway under the C. P. R. at First Street East was completed and the subway at Eighth Street East was also finished except for the paving and sidewalks. The year was one of exceptional activity with the electrical department in both underground and overhead work. In the waterworks department nearly 200,000 linear feet of water mains of various sizes were laid, —double the amount laid in 1910. It is of interest to note that the waterworks department has just installed a 5,000,000 gallon electric pump, supplied by The John Inglis Company, of Toronto. At the gravity intake, new and enlarged screens and filters have been put in.

City Engineer Child, of Calgary, Alta.

During the year a large amount of paving was laid by contract, the total being 312,939 square yards. Asphalt heads the list with 83,954 square yards and bitulithic is second with 90,000 square yards. Sidewalks were laid by contract to the extent of 647,349 square feet. 33.1 miles of sewers were laid, this being greatly in excess of the amount laid the previous year, attributable principally to the demand for sewers in the new territory. Mention is made of the slightly higher cost of the work owing to the increased cost of the material, labor and haulage. Operations were commenced on a six-foot trunk sewer by the Janse Mitchell Construction Company, but the work was closed down on November 25 on account of cold weather. Nearly 12,000 house sewer connections were made during 1911,—an excess of more than 600 over last year. A new rock crusher plant was purchased from Messrs. Baxter & Company, of Leeds, Eng., and is reported to be doing excellent work, crushing from 70 to

80 cubic yards a day. The new power house in Victoria Park is nearing completion. The building, with its steel trussed roofs, and the general arrangement and character of the plant, with up-to-date coal and ash conveyors, mechanical grates and stokers, induced draft, etc., is a credit to any city, and the machinery installed and tested leaves no doubt as to its capabilities when full power is in demand.

Altogether the report denotes exceptional enterprise and progress at Calgary. And it reflects no little credit upon the ability and zeal of City Engineer Child.

Progress at Belleville, Ont.

At Belleville, Ont., during 1911 considerable activity was experienced in the various departments of building, municipal and railway construction. The building total for the year was $300,000. The expenditures on sewerage, comprising 12 miles of sewers, was $80,000; five miles of granolithic walks were laid at a cost of $22,000; an expenditure of $20,000 was made on waterworks, new mains and services, while a new electric pump (of the Mather & Platt type) with a 115 h.p. motor was furnished for the waterworks by the Canada Foundry Company, of Toronto, at a cost of $3,000. Mr. J. G. Lindsay is City Engineer of Belleville.

City Engineer Lindsay, of Belleville, Ont.

The C. N. O. Railway have completed their new station building at a cost of $30,000. The new C. N. O. line from Belleville to Toronto is now completed, giving Belleville the benefit of three great transcontinental systems (G.T.R., C.N.R. and C.P.R.). In addition the Dominion Government have alotted a quarter of a million dollars for the construction of new docks and deep waterway, so that Belleville will also have excellent water transportation. With these advantages the city cannot fail to become an important industrial centre, situated, as it is, half way between Toronto and Montreal.

The matter of radial facilities between Belleville, Picton and other centres is now being considered by an English syndicate in London. A charter for an electric line through Belleville has already been granted.

The year 1912 opens most auspiciously for this important centre of the Bay of Quinte.

In our issue of the 24th ultimo, in the article relating to the work of the Geo. A. Fuller Company, it was stated in error that the Hon. Lionel Guest was the proprietor of the Ritz-Carlton Hotel, Montreal. We have since discovered that the owners are the Carlton Hotel Company of Montreal, Limited. Mr. Kenneth G. Rea is the architect.

Canadian Railway Projects

Sir William Mackenzie is authority for the statement that the Canadian Northern Railway will spend $25,000,000 west of the Lakes in extensions and betterments this year.

The Railway Committee has issued a charter to the Pacific, Trans-Canada and Hudson Bay Railway. The company proposes to build from Edmonton to Athabaska Landing, thence to Fort McMurray, thence westerly to Prince Rupert, and easterly to Hudson Bay to either Fort Churchill or Port Nelson.

An agreement has been made between the Grand Trunk Pacific Railway and the Dominion Government for the construction of a floating dry dock at Prince Rupert, B.C., to cost approximately $2,200,000 and instructions have been given to proceed with the work. The construction of this large dry dock is in charge of the Grand Trunk Pacific engineer, Mr. Wm. T. Donnelly, who has drawn the plans and specifications.

It is officially announced that the Grand Trunk Pacific will spend $20,000,000 in railway building, hotels and stations in Western Canada this year. On the main line, 185 miles are to be east of Fort George and 150 miles west of Fort George, which will leave only 200 miles to complete the line between Winnipeg and Prince Rupert. A total number of 500 miles of branch lines to Moose Jaw, Brandon, Calgary, Battleford, Prince Albert, and the Alberta Coal Fields will be completed, and the building of the line from Calgary to Lethbridge will be started. The terminals of Regina will be completed and passenger service will be inaugurated between Winnipeg and Regina, and Winnipeg and Fort William. This work will all be done this summer if the supply of labor is sufficient and the steel can be secured for the laying of track.

The Grand Trunk Railway Company intend to rush the work on the series of hotels planned across the continent. The structures are to be on the lines of the Chateau Laurier, Ottawa, and Fort Garry, Winnipeg. Plans for the hotel in Edmonton (containing 150 rooms and estimated to cost $750,000) are now finished and the contracts are shortly to be awarded. An hotel of a similar character is to be erected in Regina, the plans for which are now in hand, while plans have also been prepared for the first of the mountain hotels at Miette Hot Springs. Another large mountain hotel is to be erected in the vicinity of Mount Robson, the highest mountain in the Canadian Rockies, which towers above the Grand Fork Valley about 11,000 feet and is 13,700 above the sea level. Plans have also been prepared for the new hotel at Prince Rupert, work upon which will be proceeded with shortly.

Route plans have been prepared for the first section of the Central Railway of Canada from Montreal to Ottawa. The line will be constructed by E. J. Wills & Sons, of London, England, who are represented in Canada by Mr. David Lyall. The chief engineer is Mr. F. Stuart Williamson. A double track will be laid from Montreal as far as St. Eustache. The new line will not be sub-let, as Mr. Lyall will personally superintend the construction. No engineering difficulties between Montreal and Ottawa are anticipated and nothing worse than a four-tenths grade will be found on the line between Montreal and Midland. The construction of the three heavy bridges at the Back River, St. Eustache and at St. Andrews will be commenced when spring opens, and by fall most of the masonry will have been placed in position.

Personal Mention

Mr. J. Stoddart, of Toronto, has been appointed assistant engineer in the waterworks department of Hamilton, Ont.

Mr. Albert G. Macfarlane, formerly District Engineer of the Transcontinental Railway at Almonte, Ont., has been transferred to St. Boniface, Man.

Mr. H. J. Fuller, president of the Canadian Fairbanks-Morse Company, and Mr. William Lyall, of the Lyall Construction Company, have been appointed members of the Council of the Montreal Board of Trade.

Sir George Whitehouse, the eminent English engineer, was in Montreal last week and paid a special visit to McGill University to inspect the Engineering Department there. He expressed unqualified approval of the facilities provided.

At a recent meeting of the Quebec Builders' Exchange Mr. E. T. Nesbitt was re-elected president for a third term. Mr. P. A. Lamonde was elected vice-president and Mr. Alphonse Cote, secretary-treasurer.

Mr. E. L. Cousins

Mr. E. L. Cousins, who has been appointed engineer to the Harbor Commission of the City of Toronto, is an honor graduate of the University of Toronto. At the time of his appointment two or three weeks ago, he had been for some time assistant city engineer under Mr. C. H. Rust. During his connection with the city he prepared a number of important plans, including those for the Ashbridge's Bay docks, the sea wall and the proposed underground railway. He is well known in professional circles and was recently elected a director of the Engineers' Club of Toronto.

Mr. J. Antonisen, Moose Jaw's new City Engineer

Mr. J. Antonisen, who was at one time city engineer of Port Arthur, has been appointed city engineer of Moose Jaw. Mr. Antonisen was born at Christiana, Norway, in February, 1869, and migrated to the United States at the age of nineteen. In February, 1905, he secured a position with the C. P. R. and was appointed resident engineer at Winnipeg under the late Mr. Schwitzer, who was divisional engineer there at that time. In April, 1906, he went to Port Arthur as town engineer. A detailed sketch of Mr. Antonisen's career was published in our issue of June 8, 1910.

Out of five candidates who were examined for the position of assistant mechanical engineer on the Montreal aqueduct, Mr. Ephrem F. Valiquet has been selected by the Board of Control. The appointment is a new one under the budget of 1912.

Major R. W. Leonard, the Chief Commissioner of the Transcontinental Railway, was recently entertained at dinner by the Montreal branch of the Royal Military College Cadet's Club. Major Leonard spoke on the strategic value of the Transcontinental Railway. Mr. Duncan Macpherson, Major Leonard's assistant, was also a guest of the club.

It is stated that the city authorities of Vancouver are thinking of engaging Mr. T. H. Mawson, the well known

Members of the Canadian Society of Civil Engineers photographed outside Headquarters at the recent Convention at Montreal

English expert, to go to Vancouver next spring and prepare for the Parks Board a plan for the development of Stanley Park. Mr. Mawson, it will be remembered, came to Canada last fall on a mission for the Ottawa authorities and has been instructed to lay out the grounds around the Ottawa Parliament buildings as well as the Niagara Falls Park. He is now engaged on the parks and gardens surrounding the Peace Palace at The Hague. In addition to that he is undertaking the beautification of the private grounds of The Queen-Mother Alexandra's Palace at Copenhagen.

Construction News and Notes

Mr. J. G. Sing's appointment as consulting engineer to the Toronto Harbor Commission has been finally confirmed.

The Builders' and Contractors' Association of Essex held their annual dinner at Windsor on the evening of February 1.

City Engineer Ker, of Ottawa, estimates the cost of building a sand filtration plant on Lemieux Island at about $1,000,000.

An address on City Planning was given recently by Mr. Jno. M. Lyle before the Architectural Club of the University of Toronto.

The date for receiving competitive plans for the proposed new Parliament Buildings at Winnipeg has been extended to March 31, 1912.

The suit brought against the city of Toronto by Mr. E. J. Lennox, the architect for the city hall, to recover $210,000, has been closed at $60,000.

The building permits issued at New Westminster last month aggregated in value $85,988, according to information furnished the Contract Record by Mr. Wm. Turnbull, Building Inspector.

The city of Victoria, B.C., has formed a local chapter of the B. C. Society of Architects. Mr. Hoult Horton is president and Mr. F. M. Rattenbury, honorary president. The secretary-treasurer is Mr. Jno. Wilson.

A survey has been made and plans drawn up for a new sewer outlet at St. Lambert, P.Q. The work is estimated to cost $56,534. Provision has also been made for a site for a purification plant if found to be necessary later.

It is reported that the contracts already secured and those likely to be signed shortly will result in the Lyall Construction Company, Limited, Montreal, carrying out work to the value of $5,000,000 during the present year.

There is some talk of the erection of a large cement plant in Albert county, New Brunswick. British interests are said to be behind the project. The initial capacity of the plant, it is said, will not be less than 2,500 barrels a day.

Recent Vancouver incorporations include the Acetylene Construction Company, with a capital of $10,000; the Howe Sound Gravel Company, Limited, with a capital of $100,000; the Canada Mainland Construction & Investment Corporation, Limited, with a capital of $500,000, and the Electric Lumber Company, Limited, with a capital of $100,000.

The annual bonspiel of the Winnipeg Builders' Exchange opened last week with over 30 rinks in competition. The Carter cup and the Minty cup were the chief attractions of the meeting. In the Carter cup, four gold watches, presented by His Honor Lieut.-Gov. Cameron, went to the winners. Four marble clocks were given by Messrs. Thos. Kelly & Sons, and four watch fobs and lockets by the Canadian Enamel Brick & Tile Company. Consolation prizes were given by The Manitoba Bridge & Iron Works, Mr. J. D. McArthur, the Marshall-Wells Company, and the National Supply Company, Limited.

The Controllers of Montreal have decided to recommend the immediate construction of five underground lavatories, the cost of which will be about $175,000. It is also under consideration to build a central refrigeration plant in Bonsecours Market at a cost of $25,000, it being estimated that a charge of 12½c. per annum per cubic foot of space rented will meet capital and maintenance charges.

Several changes have been made in the Bill constituting a permanent Parks Commission for the Island of Montreal and district. The commission will have authority to deal with parks, streets and boulevards, slums, model towns, etc., and it is now provided that no great work is to be begun without the special consent of the municipal authorities. The act will not come into operation in any municipality without a by-law of the municipal council.

The immigration sheds at Quebec, the contract for which has been secured by Messrs. C. E. Deakin & Company, Montreal, will be of concrete and steel. They will be two storeys high and will be so arranged that the immigrants will disembark on the second storey. The buildings will be over 700 feet in length, and the accommodation will be sufficient for approximately 1,500 people, which is considered amply sufficient, as only one vessel will be unloaded at a time.

Among the features of the extensive power development which is to be undertaken this year by the British Columbia Electric Railway Company is the installation of three Doble water wheels, the contract for which has been awarded to the John McDougall Caledonian Iron Works Company, Limited. These wheels will be the largest of the kind on the continent. Each will have a capacity of 14,000 h.p. The wheels are a part of an extensive scheme at Lake Buntzen, B.C.

There was a very large audience at a meeting of the McGill Undergraduate Society of Applied Science, Montreal, on January 31, to hear Mr. A. Allaire, general manager of the Foundation Company, Limited, describe "Foundation and Caisson Work." Mr. Allaire's paper, which was illustrated by means of slides, was greatly appreciated, and at the close he was heartily applauded. Dr. Adams (honorary president of the society) and Professor Ernest Brown spoke briefly on the subject, thanking Mr. Allaire for his address.

Obituary

Mr. Henry Miller, a well known building contractor of St. Thomas, Ont., died last week. The deceased was born at Markham, Ont., in 1833 and had resided in St. Thomas for more than 40 years.

Mr. J. E. Curtis, for many years a partner in the firm of Messrs. Nicholson, Curtis & Wick Company, cut stone contractors, Toronto, passed away last week at his home in Toronto, after a somewhat protracted illness.

Mr. Isaac J. Johnson, who is known as the inventor of Portland cement and who recently attained his 100th year, passed away last month at Gravesend, in England. The late Mr. Johnson was born in 1811 at Vauxhall of working class parents and early in life entered the service of a firm of cement manufacturers, where he attained such proficiency in every branch of the business that he quickly rose to an important position in the company. Later he obtained a good appointment as manager of a large cement factory in Kent, and it was while in this employment that he invented the world-famous Portland cement. Mr. Johnson's life story is a conspicuous instance of the crowning success of dogged perseverance.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Edmonds, B.C.

Tenders will be called for supply of pipe for new water mains. Clerk, W. Griffiths.

Hamilton, Ont.

Council has authorized construction of new mains at an estimated cost of $6,672. Also when ten per cent. revenue is guaranteed, following mains on Leinster avenue, $1,712 and Prospect street, $1,704. A 12-in. water main will also be constructed on Ottawa street, under G. T. R. tracks to Grasselli Chemical Co. plant, 700 ft. City Clerk, S. H. Kent; City Engineer, A. F. Macallum.

Specifications are being prepared for new roads to cost $20,000. Main street carried over west end as high level road. City to get authority to issue debentures. New cement retaining will will be required. Work will be started in the spring. City engineer, A. F. Macallum.

Council has authorized construction of new sewers—distance of about 1,204 ft.; estimated cost $7,783. Tenders will be called later. City Clerk, S. H. Kent; City Engineer, A. F. Macallum.

Specifications will be prepared shortly for new gravity sewage disposal plant. Work will be proceeded with next summer or in the fall. Cost $70,000. Mayor, Geo. H. Lees. Engineer, A. F. Macallum.

Specifications are ready for waterworks extension to cost $250,000. City Engineer, A. F. Macallum.

Medicine Hat, Alta.

City Engineer, A. K. Grimmer and Council will consider construction of reservoir, capacity 40,000,000 gallons. Work on the sewage system in East allowance has been started.

Ottawa, Ont.

Tenders are called for supply of vitrified pipe. Received by Secretary Bd. of Control, until 4 p.m. Feb. 13th. City Engineer, N. J. Ker.

Point Grey, B.C.

Tenders are called until Feb. 19th for supply of valves, hydrants and special castings for Point Grey water supply Municipality of Kerrisdale; Clerk, H Floyd, Kerrisdale. Engineers, Cleveland & Cameron, Winch Bldg., Vancouver.

Pointe Claire, Que.

Tenders are called for construction of water works, sewage and electric light installation. Plans, etc., at office of Town Engineer. Received by Sec.-treas until 6 p.m. Feb. 2nd. Sec.-treas., Ralph E. Stockwell; Town Engineer, V. H Dupont, 62 St. James street, Montreal.

Regina. Sask.

R. O. Roberts, waterworks expert, in his final report of the water supply recommends 10 or 11 sources to meet present and future requirements capable of supplying 7,000,000 gallons, at an estimated cost of $1,106,000. City Engineer, L. A. Thornton.

Sudbury, Ont.

Tenders are called for pumping station equipment. Supply and installation of two return tubular boilers, with feed-water heater, boiler feed pump, piping, etc.; two horizontal compound duplex steam pumps of 900 Imperial gallons capacity each; also one 12-in. Venturi water meter with piping etc. Plans, etc., at office of Town Clerk. Received by clerk until 1 p.m. Feb. 5th. Mayor, J. G. Henry; clerk, Geo. Elliott.

Toronto, Ont.

Tenders are called until Feb. 13th for construction of sewers on Benson ave., Rushton road, Glenham avenue and Harrington street. Specifications at office of City Engineer. Chairman Board of Control, G. R. Geary.

Vancouver, B.C.

The following work is planned: construction of sewers on Bridge street to cost $17,300; and culverts to cost $1,475 on Powell street. City Clerk, W. McQueen.

Victoria, B.C.

City Engineer Smith recommends the purchase of City Asphalt plant with capacity of 1000 yards per day. Cost, $15,000. Proposed paving in sight, 700,000 yds., half of which is planned for this year.

Victoria, B.C.

A permit has been granted to erect mineral water plant on Hereward street, for The Regal Mineral Water Co. Officials, C. Moses, J. T. Lowery and Albert German. Electric power to be used. Part of necessary machinery has been purchased.

Decision has been made to purchase water pipe to cost $55,000; 10,000 ft. of 10-in., 10,000 ft. of 8-in., 50,000 ft. of 6-in., and 50,000 ft. of 4-in. pipe. In addition there will be purchased 1,220 water meters of the Trident type at a cost of $17,670. City Purchasing Agent, W. M. Northcott, Victoria; City Engineer, Angus Smith.

The City Council and Oak Bay representatives have agreed as to location of trunk sewer in Oak Bay. Oak Bay ratepayers passed by-law to provide $35,000 toward it and will construct it from city limits to Shoal Bay. Total cost $140,000.

Windsor, Ont.

Tenders are called until Feb 6 for concrete pavement on macadam foundation on Ouelette and Gladstone avenues. Cost $40,000. Mayor, J. W. Hanna; clerk, Stephen Leisteed. Engineer, M. E. Brian.

Tenders will be called for 75,000 yds. concrete paving to be laid in the spring on McDougall avenue. Cost $10,000. City Engineer, M. E. Brian.

CONTRACTS AWARDED

Quebec, Que.

New water supply (c.i. pipe). Engineer, Gallagher, Forrester & Tremblay. Contractor, M. Connolly, Quebec, $716,799; contract includes piping, trenching, laying and cartage.

Vancouver, B.C.

The contract for trenching for Seymouour Creek extension goes to the Burrard Engineering Co., $40,250. C. E. Pottage, Portland, Ore., having withdrawn his bid.

Railways, Bridges and Wharves

Hope, B.C.

It is stated that surveys for double tracking Canadian Pacific Railway between Spence's Bridge and Hope, have been completed. This involves 100 miles. Construction it is stated will start early next year. Cost $20,000,000. Surveys for a similar line between Lytton and Kamloops have also been made.

Lockport, Man.

Tenders are called for construction of East and West highway approaches to Steel Service Bridge. Plans, etc., at Dept., at offices of District Engineers, at Winnipeg, Toronto and Montreal, and on application to local postmaster. Received by Secretary until 4 p.m. Feb. 20th. Dept. of Public Works, Ottawa. Sec., R. C. Desrochers.

London, Ont.

County Engineer Talbot will prepare plans and tenders are to be called shortly for the erection of a bridge on Giles street to cost $4,500.

Rough estimates have been prepared for bridge, 270 ft. length, no piers in centre. Centre span or main portion to cost not less than $20,000.

Meaford, Ont.

Tenders are called for extension to breakwater and removal of L on West breakwater and dredging. Plans, etc., at Department and at offices of District Engineers, Toronto and Windsor, Ont.; and on application to local postmaster. Received by secretary until 4 p.m. Feb. 26th. Secretary, R. C. Desrochers; Dept. of Public Works, Ottawa.

Montreal, Que.

Tenders are called for marble flooring, etc., for station, for Canadian Pacific Railway, Montreal. Architect, F. E. Ellingwood, Windsor street; office; marble required for stairs, halls, toilet rooms, wainscotting, terraza flooring, for Windsor street station railway offices. Tenders to close in about a week.

Nanaimo, B.C.

The Legislature will be asked this session for authority to construct tramway from Nanaimo to Brecken through Northfield, East Wellington, etc., to Nanaimo River Bridge, etc.

Nelson, B.C.

Plans are prepared for bridge, cost $15,000. Engineers, A. L. McCullock, C. E. Nelson. Five Howe truss spans each 160 ft. long, 18 ft. wide, piers built on pile foundation.

North Battleford, Sask.

The citizens of the two Battlefords have been conferring together in regard to a high level bridge to cost about a million dollars.

North Vancouver, B.C.

The North Vancouver Dock & Storage Co., Ltd., applied to council for permission to extend docks along waterfront at a cost of $50,000.

Ottawa, Ont.

It is proposed to erect a new steam railroad for Ottawa, Abittibi & Hudson Bay Railway. The first reading has passed Quebec Legislature and work is expected to start in 12 months. Head director, Philip O'Reilly, Ottawa.

Quebec, Que.

Tenders soon to be called for new steel bridge over St. Charles River between City of Quebec and Limoilou.

Tenders were called for construction of steel bascule or rolling lift bridge opposite Bridge street over St. Charles River. Received by City Engineer until 4 p.m. January 31st. City Engineer, W. D. Baillairge.

St. Andrews By-the-Sea, N.B.

Tenders are called for an electric elevator for Canadian Pacific Railway Co., Montreal. Architects, Saxe & Archibald, Beaver Hall Hill, Montreal, are calling for tenders for electric service elevator for Algonquin Hotel.

Vancouver, B.C.

Application to be made to Council by an auxiliary Company of the Western Canada Power Co. for several streets for the new street car line between Mission City and Vancouver.

Winnipeg, Man.

Tenders are called for pier and abutments, extension of piers and abutments of the Red River bridge. Received by divisional engineer until February 14th. Owner, Canadian Pacific Railway; Divisional Engineer, Frank Lee.

Public Buildings, Churches, Schools, etc.

Alexander, Man.

The by-law carried to erect school, cost $20,000. Six rooms, hot air heating. Shillington & Marshall, architects, Brandon, have prepared plans.

Brantford, Ont.

New tenders have been called for building, cost $100,000, for Young Men's Christian Association. Local secretary, Geo. L. Goody. Architects, Burke, Horwood & White, 28 Toronto street, Toronto. Four storeys, 132 x 160. New tenders on revised plans received by secretary until February 3rd.

Eastview, Ont.

Plans are being prepared for new school, near Ottawa, for Separate School Board. Chairman, Joseph Charette. Architect, Frank Sullivan, Ottawa. Three storeys, 11 rooms. Tenders will be called shortly.

Fingal, Ont.

The Public School Board contemplate the erection of a new school, cost $5,200, 7 miles west of St. Thomas. Architect, John T. Findlay, St. Thomas. Two rooms, brick, cement block foundation, slate roofing, hot water heating, mechanical ventilation, modern desks and blackboards. S. Teare, secretary.

Galt, Ont.

Tenders are called for new building for Young Men's Christian Association. Local secretary, W. R. Cook; architect, Shattuck & Hussy, Chicago. Separate trades as follows: Masonry, cut stone, structural iron, carpentry, sheet metal, plumbing and heating, plastering, composition roofing, glazing, Portland cement paving, electric wiring, marble and masonic or bulk tender. Plans, etc., at office of secretary. Received by secretary until 10 p.m., February 24th.

Greenwood, B.C.

Dept. of Public Works, Ottawa, are considering the erection of a new post office to cost $25,000. Secretary, R. C. Desrochers.

Guelph, Ont.

The Royal Astronomical Society of Canada contemplate building an observatory, cost $3,200. President, Prof. L. B. Stuart, University of Toronto.

Additions are planned for Winter Fair building. A big new arena for horse exhibits is being considered. Secretary, Mr. Westervelt, in charge.

Hamilton, Ont.

Plans are approved for new church, cost $50,000, Main street east, for St. Giles Presbyterian Congregation. Pastor, Rev. J. B. Paulin, 14 Fairleigh Crescent, Hamilton. Architects, Stewart & Witton, 2 Hughson street, Hamilton. Architects instructed to prepare specifications. Tenders called in about a month.

Board of Control has approved plans for new underground lavatories. A. W. Peene, architect, 2 King street west, is preparing specifications and will shortly call for tenders. Estimated cost, $20,000.

Architect W. E. Hunter, Detroit, Mich., U.S.A., has been instructed to prepare plans for new Sunday school building in connection with First Methodist Church, King street west. Total cost $110,000. Pastor, Rev. E. B. Lancely, 219 Main street east. Secretary Quarterly Board, Davis, c/o "The Times," Hamilton.

Masonic Order, Secretary, R. L. Gunn, 10 Gore street, Hamilton, are contemplating the erection of a new Masonic Temple.

Masonry and steel work about done for Grand Stand, etc., for Hamilton Jockey Club; general manager and secretary-treasurer, A. R. Loudon, Grand Opera House. Architects, Stewart McPhie, Bank of Hamilton Building, Hamilton. Tenders called in about two weeks for wiring, roofing, carpentry, iron and ornamental iron, plumbing, heating, drains, cement work, brick walks. Total cost about $60,000.

Keremeos, B.C.

Tenders are called for quarantine station. Received by Deputy Minister until March 1st. Deputy Minister and secretary of Agriculture, Ottawa, A. L. Jarvis. Address Wm. Thompson, V.S., Keremeos, for information.

Lajord, Sask.

Tenders are called for school for Prairie Flower School District No. 989. Secretary-treasurer, A. W. Rogers, Lajord, Sask. Two storeys and basement, brick. Received by secretary until February 10th.

Lethbridge, Alta.

Plans have been prepared for Normal & Domestic Science School, cost $40,000. One storey, full basement. H. M. & W. A. Whiddington are the architects.

School Board propose to erect a new school, cost $80,000, Galbraith st. Three storeys, 8 class rooms, auditorium on third floor. Plans prepared by H. M. & W .A. Whiddington were accepted. Tenders called shortly.

London, Ont.

Tenders are called for alterations to City Hall, brick, carpentry. Plans, etc., at office of City Architect. Received by Chairman until 5 p.m., February 5th. City Architect, A. E. Nutter; chairman, City Hall Building Committee, W. G. Coles.

Montreal, Que.

Tenders will be called shortly on moving picture theatre, cost $100,000, cor. Mansfield and St. Catherine streets, for Canadian Amusement Company, 322 St. Catherine street; G. Nicholas, manager. Architect, D. J. Crighton, Jacobs Building, Montreal. Fifty feet high, 44 x 91, colored tile front and concrete, concrete foundation, hot water heating, electric lighting. Galleries and 18 boxes, basement to contain billiard parlor, barber shop, etc.

Plans are being prepared for addition to school, Sarah Maxwell School, Owner, Protestant Board of School Commissioners. Architects, Nobbs & Hyde, Beaver Hall Hill. Canadian Domestic Engineering Company, Limited, 5 Beaver Hall Square, in charge of heating and ventilating installation; ready for figuring about February 15th.

Tenders are called for library, cost $150,000, for The Sulpician Fathers, St. Denis street, Montreal. Architecet, Eugene Payette, 108 St. Francois Xavier street, Montreal. 70 ft. high, 100 x 103; concrete foundations, etc. Tenders for stone, brick, steel and fireproofing work received by architect until Feb. 15th.

Plans are being prepared for new school, Laurier Ward, for Protestan Board of School Commissioners. Architect, Nobbs & Hyde, Beaver Hall Hill Montreal. The Canadian Domestic Engineering Co., Ltd., 5 Beaver Hall Sq are preparing plans for heating and ventilation, which will be ready for tender by February 15th.

The Canadian Society of Civil Engineers, Dorchester street, are instructe to sell head office and provide new headquarters at an outlay of $100,000. Immediate action to be taken. Presiden

W. F. Tye; vice-president, H. H. Vaughan.

Directors of Royal Victoria Hospital, president, Sir Edward Clouston, have authorized the erection of a sixteen-room extension for private patients. Entire cost to be defrayed by president.

Improvements to cost $175,000, including five public lavatories, will be made during the summer at Champ de Mars. Engineer, G. Janin.

Newcastle, N.B.

The County Council voted on the 19th of January to build a new Court House, at a cost of $30,000.

North Lethbridge,

Plans have been prepared for addition to school, cost $6,000, on Westminster school. Addition to be used for gymnasium. Plans prepared by E. E. Carver.

Ottawa, Ont.

The recommendation to issue debentures shortly to provide for new fire station to replace No. 7, removal of which is necessitated by widening of Somerset street, has been approved. Cost $25,000.

Bank Street Presbyterians plan to erect a new church on Cooper and O'Connor streets. Pastor, Rev. J. H. Turnbull, M. A. Present building bought by C. Jackson Booth to be vacated in five months.

Board of Control recommends selling of No. 7 fire station for the widening of Somerset street and buying of site for new fire station for that district. City Council to consider recommendation.

Port Arthur, Ont.

At the annual meeting of St. Paul's Presbyterian Church it was decided to get necessary preliminary plans for a new church; Judge McKay, Messrs. L. Walsh, J. C. Dobie and others were appointed committee. Cost $50,000. Congregational secretary, Dr. McEwen.

Rosthern, Sask.

The German-English Academy, secretary, F. F. Siemers, are planning to build a large addition to the Girl's Home

Ste. Genevieve, Que.

Plans are being prepared for school, cost $60,000, for Peres St. Croix. Architect, Dalbe Viau, 76 St. Gabriel street, Montreal. Four storeys and basement, 136 x 56, brick, hot water heating, hardwood interior finish, gravel roofing. Tenders to be called in two weeks.

Shelburne, Ont.

The Anglican Congregation are planning to erect a new brick church at a cost of $8,000. Address G. M. Vanee, K.C., H. White, or Rey. J. S. Adamson, all of Shelburne.

Sherbrooke, Que.

Tenders are called for erection of Sunday school for Methodist Church. Chairman building committee, Geo. Armitage. Plans, etc., at office of chairman. Received by chairman until February 24th.

Strathroy, Ont.

County Engineer Talbot, London, is in charge of the proposed alterations to House of Refuge. New lighting system and interior work will probably be installed.

Strathcona, Alta.

Public School Board of Strathcona purchased a site last year between 7th and 8th avenues south and 6th and 7th streets east, and plans will be prepared at once for a new school; work to start in the spring. Cost $60,000.

Swift Current, Sask.

Tenders are called for erection of theatre. Architects, Sharon & Darrach, Regina. Bids on several trades received by architects until February 16th.

Toronto, Ont.

Baptist Church, Myrtle avenue, are contemplating the erection of a Sunday school. Pastor, Rev. W. Roadhouse. Funds are now being raised.

Plans will be prepared for University Building, College street west, for University of Toronto. Architects, Sproatt & Ralph, 90 Yonge street, Toronto. 3 and 4 storey building, fireproof, mill construction, with cut stone exterior, memorial hall, theatre, accommodation for Y. M. C. A. and Students' Union, gymnasium, swimming tank, Credit Valley cut stone.

Plans have been prepared for police station, Markham and London streets, by City Architect MacCallum, and are now before the police commissioners.

Christie Street Baptist Church are planning the erection of a building on the present site to seat 1,000 people.

Tenders are open for alterations to club house, Centre Island, cost $38,000, for Royal Canadian Yacht Club. Architect, Jno. M. Lyall, 14 Leader Lane. Brick, concrete foundation, Welsh tiles. steam scullery, bar, laundry equipment, cold storage, plate and art glass, dumb waiters, Keenes' cement dado. Separate tenders required in each trade.

Tenders are open for picture theatre, cost $8,000, cor. Queen and Booth, for Pedro Lamantia, 103 Queen street west, Toronto. Two storeys, brick and concrete, steel, office furniture and seating, upper storeys will be used as apartments.

Riverdale Presbyterians propose to erect a Sunday school building in the spring at a cost of $27,000.

Vancouver, B.C.

The City Council, as a result of City Hall plebiscite, desided to call in near future for competitive plans for new City Hall, cost $750,000, Cambie and Pender streets. A money by-law will be submitted during the summer.

Victoria, B.C.

The First Baptist Church; clerk, T. H. King, have formed a building committee to arange for the erection of a new stone church on Fisguard street.

The Council has petitioned the Provincial Government in regard to moving jail outside City limits; Mayor Beeksmit states government does not propose re-building jail on Topaz ave., recently destroyed by fire.

Tenders are called for erection of a 5-room 2-cell jail and constables' quarters at Quathiaski Cove, Valdes Island. Plans at Department, at office of government agents at Cumberland and Nanaimo. Received by Minister of Public Works, until February 7th. Dept. of Public Works, Victoria. Engineer of Public Works, J. E. Griffith.

Winnipeg, Man.

Tenders are called until Feb. 8th for seating required for Kelvin and St. John's Technical High Scrool. Specifications with J. B. Mitchell. Sec.-treas., R. H. Smith. Comm. of Supplies, J. B. Mitchell, School Board office.

Woodstock, Ont.

St. Mary's Roman Catholic Church, Father Stanley in charge, will hold a congregational meeting shortly to consider proposition of new church, building funds for which are now on hand.

CONTRACTS AWARDED

Granby, Que.

Boy's College, cost $60,000, for Catholic School Commissioners. Architect, Dalbe Viau, 76 St. Gabriel street, Montreal. General contractor, Boileau Bros., Ile Bizard, Que. Five storeys, 11 x 53, 3 extensions, 32 x 30, pressed brick, stone foundation, steam heating, electric lighting, gravel roofing, hardwood floors, two fire escapes, ventilation system, specified by Canadian Domestic Engineering Co., Ltd., 5 Beaver Hall Square, Montreal. Contract awarded January 24th.

Quebec, Que.

Contract is awarded for erection of a fire hall to cost $46,223, to Ginehereau & Lamonde, contractors. Fire Dept., Chief Hamel.

Residences

Calgary, Alta.

Plans have been filed for apartment block, cost $30,000, for Horace Cromar, Calgary. Architects, Laing & Smyth, 8th ave. east. Three storeys and basement, concrete foundation, pressed brick, stone trimmings.

Mr. Gardener, 11th street east, is contemplating the erection of an apartment house on 11th ave. west, to cost $30,000.

Dundas, Ont.

Tenders are open for the erection of a residence, cost $12,000, for Col. J. J. Grafton, Dundas. Architects, Chadwick & Beekett, 18 Toronto street, Toronto. 2½ storeys, Roman stone, mantles, tiles, hardwood floors and interior finish, hot water heating, electric lighting.

Montreal, Que.

Foundations are started for four flats, cost $4,000, Angers street, for Narcisse Boyer, 66 Church street, Montreal. Two storeys, 53 x 45, pressed brick, stone foundation, electric light, gravel roof.

A permit has been granted for apartment house, cost $100,000, Cote des Neiges ave. and Sherbrooke street, for J. H. Maher, 35 Guardian Building, 160 St. James street, Montreal. Ten storeys, 44 x 108, concrete on steel frame with stone facade, steam heating, electric lighting, reinforced concrete roofing, fireproof stairs, two elevators, concrete and metal lath ceiling; underwriters' fire extinguishers provided.

Ottawa, Ont.

A permit has been granted for residences, cost $7,500, Somerset street, for F. A. Wilson, 53 Belmont ave., Ottawa. Two storeys, 79 x 31, double brick veneer and ironclad, concrete foundation electric light.

Outremont, Que.

Work has started on a residence, cost $22,000, McDougal ave., for Holland & Langridge, 280 MeDougall ave. Two-storeys and basement, 30 x 60, stone foundation, solid wire cut rustic brick and oak and chestnut veneer doors and interior trim; rockalite plaster, hot water heating, electric lighting, tar and gravel

(Continued on page 65)

Tenders and For Sale Department

To Architects and Engineers

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vanconver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

Contract Record and Engineering Review

Montreal—134 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
Chicago, Ill.

t.f.

Sand Lime Brick

Ceramic engineer, expert in the manufacture of high grade "Sand-Lime," "Silica" and "Granite" Products, with 18 years' experience here and abroad, wants to get acquainted with interested parties.

Address: "EXPERT,"
566 Wellington Street West,
Toronto, Ont., Canada.

Notice to Contractors

Civic Supplies

Sealed tenders addressed to the Chairman and Members of the Board of Control, City Hall, Ottawa, will be received by the Secretary of the Board of Control, City Hall, Ottawa, up to 4 p.m., **Tuesday, February 13th, 1912**, endorsed "Tender for Broken Stone, Brick, Stone Setts, Cement, Plank and Cedar, Sand, Vitrified Clay Pipe, Asphalt, Castings, Street Sweeper Brooms, Hardware, or Street Sprinkling Wagons," as the case may be.

Specifications, form of tender and full particulars may be obtained on application at the City Engineer's Office, City Hall, Ottawa.

Any tender received after the above stated time will be declared informal.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
City Engineer.
Ottawa, Jan. 31, 1912.
6

NOTICE TO CONTRACTORS

Waterworks Supplies

Sealed tenders addressed to the Chairman of the Waterworks Committee, City Hall, Ottawa, will be received by the Secretary of the Waterworks Committee, up to 4 p.m., **Tuesday, February 13th, 1912**, for the supply and delivery of Brasswork, Special Pipe Castings, Hydrants, Cast Iron Pipe, Lead Pipe and Pig Lead, Valves, Oils and Grease, as the case may be.

Specifications, form of tender and full particulars may be obtained on application at the City Engineer's office, City Hall, Ottawa.

Any tender received after the above stated time will be declared informal.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
City Engineer.
Ottawa, Jan. 31, 1912.
6

Tenders Wanted

Sealed tenders marked "Tenders for Bridges," will be received by the undersigned until noon **February 17th, 1912**, for the erection of two bridges over the Boyne River at Carman, Man.

(1) For the supply of Piles, Timber and Lumber.

(2) For the supply of Iron Material.

(3) For the work in erection and construction of the two bridges.

(4) For the erection and construction of each bridge, contractor to supply all labor and material required.

All material to be delivered at Carman not later than April 1st, 1912.

(5) For 25,000 ft. 2 x 8, 2 x 10 and 2 x 6 B. C. Fir, 16 ft. long.

Plans and Specifications for Bridges may be seen at the office of the Manitoba Government Engineer at Winnipeg, Man., or at the office of the undersigned.

The lowest or any tender not necessarily accepted.

A. MALCOLMSON, Sec.-Treas.,
Town of Carman.
6-7

City of Calgary, Alberta

Tenders for Bridge

Sealed tenders marked "Tenders for Bridge," addressed to the City Clerk, Calgary, will be received up to noon of **10th February, 1912**, for the supply of material and construction of a Steel Bridge, 30 feet wide, in three spans of 150 feet each, on concrete substructure, across the Bow River, within the city limits.

Plans and full information at the office of the City Engineer, Calgary.

Each tender to be accompanied with a marked bank cheque payable to the City Treasurer for the amount of $500, which will be forfeited should any party whose tender is accepted fail to execute the contract. The cheques of unsuccessful tenderers will be returned.

The lowest or any tender not necessarily accepted.

CITY COMMISSIONERS,
Calgary, Alta.
3-6

Tenders for Supplies 1912

City of Brandon, Manitoba

Sealed tenders will be received by the City Clerk, Brandon (to be endorsed "Tender for Supplies, 1912") until 12 o'clock at noon on **Friday, the 8th day of March next**, for supplying the following materials f.o.b. Brandon, freight and duty paid, viz.:--

Sewer Pipe.

To be salt glazed and vitrified.
36, 27, 30, 24 inch, double strength.
15, 12, 10, 8 inch, Standard strength.
In carload lots, breakage at risk of manufacturer.

Water Pipes.

In accordance with Specifications of the Canadian Society of Civil Engineers.
10, 8, 6, 4 inch (in carload lots) for 300 feet lead.

Brass Goods.

Curb Cocks, 1½, 1, ¾ and ½ inch.
Corporation Cocks, 1, ¾ and ½ inch.
Check Valves, ½, ¾ and 1 inch.
Three-way branches, 1½ x 3, 1 inch.
Two-way branches, ¾ to ½ inch.
All threads to be for Muller Tapping Machine.

Lead Pipe.

1½, 1, ¾ and ½ inch, for 100 lbs. pressure.

The lowest or any tender not necessarily accepted.

R. E. SPEAKMAN,
City Engineer
City Engineer's Office,
January 30, 1912.
6 & 8

Building Contractors

are invited to tender for the construction of a

Twelve Room School in the City of Windsor, Ontario.

Bids will be received by the Board of Education, addressed to the undersigned, up till

February 20th, 1912.

Separate tenders may be submitted by each trade or in bulk should any contractor desire to figure on the whole work.

All tenders to be accompanied by a certified cheque on some chartered bank, payable to the Secretary-Treasurer, for a sum equal to five per cent. of the amount of the tender, as a guarantee of good faith, such cheques will be returned as soon as contracts are signed.

Tenders must also be accompanied by the names of two responsible real estate owners who will signify in writing their willingness to become sureties by joining the contractors in executing a Bond of Indemnity for a sum equal to 25 per cent. of the contract price.

The contractor for the heating plant will be required to furnish a Guarantee Company's Bond for $2,000, covering a period of two years, to indemnify the Board against loss by reason of the plant failing to properly warm and ventilate the class rooms under all conditions of outside temperature. The Contractor to pay the first year's premium and the Board to pay the second year's premium.

Plans and specifications may be seen at the office of Gilbert I. Jacques & Co., Architects, 5 Sandwich Street West, Windsor, Ont.

ALEX. BLACK,
Secretary-Treasurer
6

TENDER FOR
Engines and Pumps

Sealed tenders addressed to D. Cochrane, Clerk of Ridgetown, Ontario, (marked "Tender") will be received up to noon of **February 14th, 1912**, for the following equipment:—One 50 h.p. Gas Engine; one Gasoline Engine; two half million gallon Triplex Pumps; three deep well pumps, etc.

Specifications and forms of tender may be seen at the office of the undersigned.

The lowest or any tender will not necessarily be accepted.

F. W. FARNCOMB,
Consulting Engineer.
London, Ont. 5-6

Tenders Wanted

Sealed tenders addressed to the undersigned, and endorsed " Tender for Young Men's Christian Association Building, at Galt, Ont.," will be received at this office until 10 p.m. on **Saturday, February 24th**, for the construction of a building for the Young Men's Christian Association on Queen's Square, Galt.

Tenders will be received for separate trades as follows: Masonry, cut stone, structural iron, carpentry, sheet metal, plumbing, heating, plastering, painting, composition roofing, glazing, Portland cement paving, electric wiring, marble and mosaic, but tenders including all trades in the contract will receive preference.

Plans and specifications may be seen at the office of the General Secretary of the Young Men's Christian Association, Water street, Galt, Ontario.

Tenders for all trades must be accompanied by an accepted cheque on a chartered bank, payable to the order of the "Treasurer of the Building Fund," equal to 5 per cent. of the amount of the tender in the case of tenders for any one trade, and of 2½ per cent. of the amount of tender in case of the tender for all trades, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fails to complete work contracted for. If the tender be not accepted the cheque will be returned. The lowest or any tender not necessarily accepted.

WILLIAM R. COOK,
General Secretary, Young Men's Christian Assn.
Galt, Ont., January 30, 1912. 6

Situations Vacant

Advertisements under this heading two cents a word per insertion. Box No. ten cents extra. Minimum charge 25 cents

Draughtsman Wanted

Competent architectural draughtsman wanted for general office work. Apply stating experience to H. C. McBride, Architect, London, Ont.

Situations Wanted

Advertisements under this heading two cents a word per insertion. Box No. ten cents extra. Minimum charge 25 cents

Architect and Surveyor, A.R.I., B.A. (25), requires post in spring. Thoroughly efficient. 22 Southborne Grove, Bournemouth, England. 6-7

BUILDING SUPERINTENDENT desires engagement, eight years experience; practical, thoroughly competent on plans, laying out work and handling men, used to large contracts. Apply Box 423, Contract Record, Toronto 5-6

Residences

(Continued from page 63)

roofing, 4-ply paper, billiard room, also garage. Building to be ready by April 15, 1912.

Toronto, Ont.

Tenders are called on residence, cost $6,000, on Avenue road, for Lieut. J. J. Drafton, Avenue road. Architect, Chadwick & Beckett, 18 Toronto street. Shingle roofing, electric lighting, cut stone, mantles and tiles, art glass, hardwood finish, 2½ storeys.

Plans are completed for three stores and apartments, cost $6,000, n.w. corner Dufferin and St. Clair, for Wm. Davies Co., 521 Front street east, Toronto. Two storeys, brick construction, hot water heating, plate glass, tar and gravel roofing, plumbing.

Tenders are open for alterations and additions to summer house, cost $5,000, Centre Island, Manton road, for F. R. Gynn, 251 Queen street east. Architect, G. M. Miller Co., 57 Yonge street.

Tenders are called for alterations to two houses, Ossington avenue, for J. Anpentry, plastering, plumbing, painting, tonio. Architects, Chadwick & Beckett. Specifications include brick work, carhot air furnace. Tenders received by architects.

Tenders are open for erection of apartments, cost $15,000, n.s. Deer Park Crescent, for T. P. Stewart, 212 Poplar Plains Road. Architect, J. H. Galloway, 23 Toronto street. Brick and stone, tar and gravel roofing. cut stone sills, boilers, reinforced concrete, plate and art glass, galvanized iron cornice, three storeys and basement.

Plans are completed for apartments, cost $4,000, Gore Vale ave., for J. Donenfeldt, Murray street, Toronto. Architect, T. S. Yolles, 244 Simcoe street, Toronto. Two storeys, brick, cut stone, mantles, tiles, tar and gravel roofing.

Tenders are open in lesser trades for three pair residences, cost $9,000, Bain ave., west of Carlow, for Hayes & Caldwell, 234 Withrow ave. Semi-detached, brick front and roughcast sides, shingle roofing.

Excavation is done for residence, cost $4,000, on Maria street, for Henry Gramblatt, 17 Fisken ave. Two storeys, semi-detached, brick.

Tenders are open for apartments, cost $15,000, Deer Park Crescent, for P. Stewart, 212 Poplar Plains Road. Architect, J. Galloway, 23 Toronto street. Three storeys and basement, brick and stone, tar and gravel roofing, cut stone sills, mantles and tiles, plate and art glass, galvanized iron cornice, reinforced concrete, boilers.

The Board of Management, Rhodes Ave. Presbyterian Church, Rev. W. Wallace Christy, pastor, have been instructed by congregation to raise funds for erection of Manse on Hiawatha avenue.

Plans are drawn for pair residences, cost $6,000, s.s. Nina ave., for C. H. Jones, 27 Ellsworth ave., Toronto. Architect, E. Aubrey Butler, 42 Adelaide street, east. Two storeys, semi-detached, brick, tar and gravel roofing.

Plans are in progress for apartment house, cor. Linden and Huntley streets, for H. P. Baird, 525 Huron street. Architech, J. H. Stanford, Westmorland ave. Tar and gravel roofing, hot water heating, structural steel, cut stone, mantles and tiles, plate and art glass, galvanized iron cornice, stucco burlap, electric bells, gas.

A permit has been granted to erect 2 pair residences, cost $10,000, Indian rd and Central ave., for Mr. Tweedy, 439 Bathurst street, Toronto. 2½ storeys, brick and stone.

Hamilton, Ont.

W. O. Sealey, 64 Hunter street west, will erect two apartment houses, cost $20,000, on Charles street, Architect, John Watt, London. Contract likely to go to R. & J. Poag, Leeming street, Hamilton.

Vancouver, B.C.

W. L. Tait, Manhattan Apartments, 784 Thurlow street, has had plans prepared by architect, W. G. Jewett, 2330 Cypress street, Vancouver, for a five-storey addition to Manhattan Apartments, 784 Thurlow street. Work to start in spring—supervised by architect.

Victoria, B.C.

Plans are completed for apartment house, cost $75,000, for Lindsay & Roberts. Architect, Robt. Knipe, Henry Bldg., Seattle, Wash. Three storeys and basement, 80 x 90, 24 apartments.

Wallaceburg, Ont.

Knox Presbyterian Church, Pastor, Rev. C. M. Tait, will been plans prepared shortly for the erection of a new manse.

CONTRACTS AWARDED

Calgary, Alta.

Terrace of residencces, cost $24,000, for D. G. Cameron, 15th ave. west, Calgary. General contractor, W. Keen, 1730 11th ave., Calgary. 2½ storeys. 125 x 36, brick veneer, concrete foundation, shingle roofing, hardwood interior finish, electric lighting, six furnaces.

Hamilton, Ont.

A permit has been granted for five residences, cost $10,000, Rutherford ave., for A. J. Taylor, 130 Markland street, Hamilton. Contractor, R. J. Wilson, 4 Rutherford ave., Hamilton. Brick.

Montreal, Que.

Further contracts were awarded for residence, cost $35,000, on Pine ave. Plumbing and heating, Ogilvie Bros., Ltd., 441 Bleury street, Montreal. Roofing, D. Nicholson & Co., 679 St. Paul street. Tile and marble not awarded.

Steel contract is let for apartment house, cost $200,000, Bishop street, for O. L. Henault, 4545 Sherbrooke street west, Montreal. Architect, C. A. Mitchell, 58 Beaver Hall Hill, Montreal. Steel contractor, National Bridge Company of Canada, Limited, Longue Pointe, Que. Ten storeys, 50 x 110, steel frame, terra cotta facings, concrete foundation, steam heating, gas and electric lighting, roof garden, interior finish marble, mosaic and hardwood, refrigerating plant, mail chutes, gas stoves for each apartment, telephone system, electric bells, plate glass throughout.

Business Buildings and Industial Plants

Amherst, N.S.

N. Curry, president Canada Car & Foundry Co., is interested in the proposed erection of a large hotel to cost $60,000.

Bathurst, N.B.

Bathurst Lumber Company have acquired property of Nepisquit Lumber Co. It is understood that construction of a pulp and paper mill will be commenced in the summer.

Berlin, Ont.

The Berlin Trunk & Bag Company are contemplating a new trunk and bag factory. A. L. Breithaupt interested. It is stated that plans will be prepared shortly.

Plans will be prepared for an office building for the Economical Fire Insurance Co. President, John Fennell. A new site will be purchased.

Brantford, Ont.

Work is about to begin on addition and alterations to store, cost $3,500, on Colborne street, for S. H. Knox & Co., Brantford. Brick addition of 13 x 65, alterations consist in replacing wall in 1st storey by columns and I-beams. Eight c.i. columns and ten girders required, hot water heating, electric lighting, interior finish pine.

Brockville, Ont.

Mayor C. W. MacLean, Arthur C. Handy, W. H. Comstock and H. Brown are interested in proposed erection of a new hotel, cost $150,000, on site adjacent to works and lighting plant. plans include docks, golf links, tennis courts, ets. The hotel will cater to both commercial and tourist trade.

Calgary, Alta.

Tenders will be called shortly for superstructure for hotel for Canadian Pacific Railway. Architect, E. L. Ellingwood Windsor street office, Montreal

A site has been purchased for stables and storage buildings, cost $30,000, for The Dominion Express Company. Three 6 storeys, 75 x 130.

Work is about to begin on the erection of a warehouse, cost $100,000, for Nicholson & Bain, commission agents, 6 storeys, 75 x 13.

It is expected a by-law will be submitted giving fixed taxation to Canada Malting Company. Plans embrace elevator and malting plant in which will be installed a pneumatic malting system. Total cost, $250,000.

Coquitlam, B.C.

Ths Coquitlam Land Holding & Development Company. and Mercer & Tyner, Metropolitan Bldg., Vancouver, are interested in the proposed erection of a large hotel to contain 40 rooms on Shaughnessy street. Cost $20,000. No architect has been chosen yet.

Cote St. Paul, Que.

Tenders are called for addition to hotel for J. H. Crevier, Power Bldg., Montreal. Architect, Dalbe Viau, 76 St. Gabriel street, Montreal. Three storeys, concrete foundations, stone construction, hot water heating, electric lighting, plate glass, electric bells, hardwood interior finish. Received by architect until February 6th.

Edmonton, Alta.

George Brown, c/o Savoy Hotel, is contemplating erection of 6-sty. stone and brick hotel on Jasper and Namayo avenues to cost $200,000. Building to be 54 x 101 feet.

Messrs. Ernest Beauport & Co., Ltd., are floating a $150,000 company $50,000 of which has already been subscribed, to put in a Madgeburg sand-lime brick plant here.

A site has been purchased for brewery, cost $250,000, for Edmonton Brewing & Malting Co., Ltd. Block of land purchased from Hudson Bay Co. Building to be completed by fall of 1913.

Granton, Ont.

The Canadian Order of Foresters (Court Carleton) has decided to equip three modern stores, in their new hall to be erected this spring. Interior fittings, lighting and heating equipment will be needed.

Hamilton, Ont.

Architect has been chosen for remodeling Simcoe Hotel, cost $6,000, on King street east, for Biggar & Gauld, Canada Life Building, Hamilton. Architect, A. W. Peene, 2 King street west, Hamilton. New front, new bar and offices.

Hawkesbury, N.S.

The Dominion Government will spend about $50,000 on additions to cold storage plant. Work to commence in June.

Lethbridge, Alta.

The Builders' Exchange propose to erect a new Exchange building. cost $50,000. Committee in charge, A. Smith, E. T. Broad and G. Power. Three stys. Store on ground floor, offices and hall on upper floors.

Lindsay, Ont.

T. W. Wakely, dry goods merchant, is planning alterations to store, Kent st., building to be extended back 30 ft. and 60 ft. in length behind the Dominion Bank, thus giving frontage of 30 ft. on William street; two storeys.

W. Beal, jeweller, proposes to tear down the jewellry and tobacco store on Main street and erect an up-to-date building, brick front, electric lighting, probably steam heating. Work to commence in spring.

London, Ont.

The proposition to erect a joint building by City and County is still under consideration. Court House site is favored for this. Estimated cost $200,000.

Plans will be prepared for pork packing plant, cost $50,000, London Jct., for E. Rechnitzer. It is stated that owner will require new machinery, engine, lighting and heating equipment.

Molson's Bank will shortly secure estimates on extensive interior alterations and new front. Work will commence in spring.

Mr. Evans, proprietor of the Grigg House, is planning to erect a two-sty. addition at a cost of $25,000.

The London Gas Power Co., P. R. Braddon, manager, are contemplating the erection of foundry in connection with engine works.

Montreal, Que.

Tenders will be called for office and warehouse, St. Antoine, for Canadian General Electric Co., Peterboro. Architects, Ross & MacFarlane. 1 Belmont street, Montreal. Five storeys, brick, cut stone, modern appointments.

Niagara Falls, Ont.

J. C. Gardner, 10 Morrison street, contemplates the erection of a store, 1-sty. and basement, 50 x 150, reinforced concrete, with curtain walls, hot water heating, electric light. Plans asked for, which will provide for three additional storeys later on.

North Bay, Ont.

Canadian Pacific Railway, Montreal, plan to construct a six-track repair shop at a cost of $250,000. The consent of town council has been received, but permission of Provincial Crown Lands Department has yet to be obtained.

Ct. Catharines, Ont.

Tenders are called until February 8th for Dominion Canners, Ltd., E. C. Kidder, manager, for construction of warehouse, 124 x 78, brick wall and mill construction.

Tecumseh, Ont.

A. Durocher has purchased Tecumseh Canning Co., and plans enlargement and installation of new machinery.

Toronto, Ont.

Excavating has been started for store and five apartments, cost $10,000, N.E. Cor. Bloor and Howland ave., for H. P. Baird, 525 Huron street, Toronto. Architect, J. H. Stanford, 17 Westmoreland ave. Tar and gravel roofing, hot water heating, electric lighting, structural steel, cut stone, mantles, fire escapes, hardwood finish and flooring, stucco, concrete, burlap, galvanized iron cornice, plate and art glass, refrigerators. Tenders for all trades received by owner.

Plans are completed for store and dwelling, cost $3,000, for J. Casselman, 2245 Dundas street, near Runnymede road. Stone and brick, tar and gravel roofing, two storeys.

Plans are in progress for restaurant, cost $20,000, Exhibition grounds, for W. C. T. U. Architect, City Architect MacCallum. Tenders open about March 1st.

A permit has been granted for store and residence, cost $3,000, for Harry Gramblatt, 17 Fisken ave. Two storeys, stone and brick, tar and gravel roofing.

Tenders are open for warehouse, cost $20,000, Cor. Richmond and Dufferin streets, for Philip Printing Co. Architect, J. P. Hynes, 199 Yonge street. Brick mill construction, composition roofing, steam heating, plumbing, four passenger elevators.

Work is in progress for elevator Pent House, Keele and St. Clair, for Swift Canadian Co. Frame and galvanized iron, Mezzanine floor. Tenders are open by owners.

The Massey-Harris Co., King street west, are contemplating the erection of a new warehouse covering four acres of floor space.

Tenders are called by C. P. R. for the removal within thirty days of all buildings on the Government House property, preparatory to the erection of a new warehouse and freight sheds, also new building for the Dominion Express Co.

Tenders are open for masonry required for Shipway Iron Bell & Wire Mfg. Co., 62 Terauley street. Architect, J. W Siddall, 75 Yonge street, Toronto.

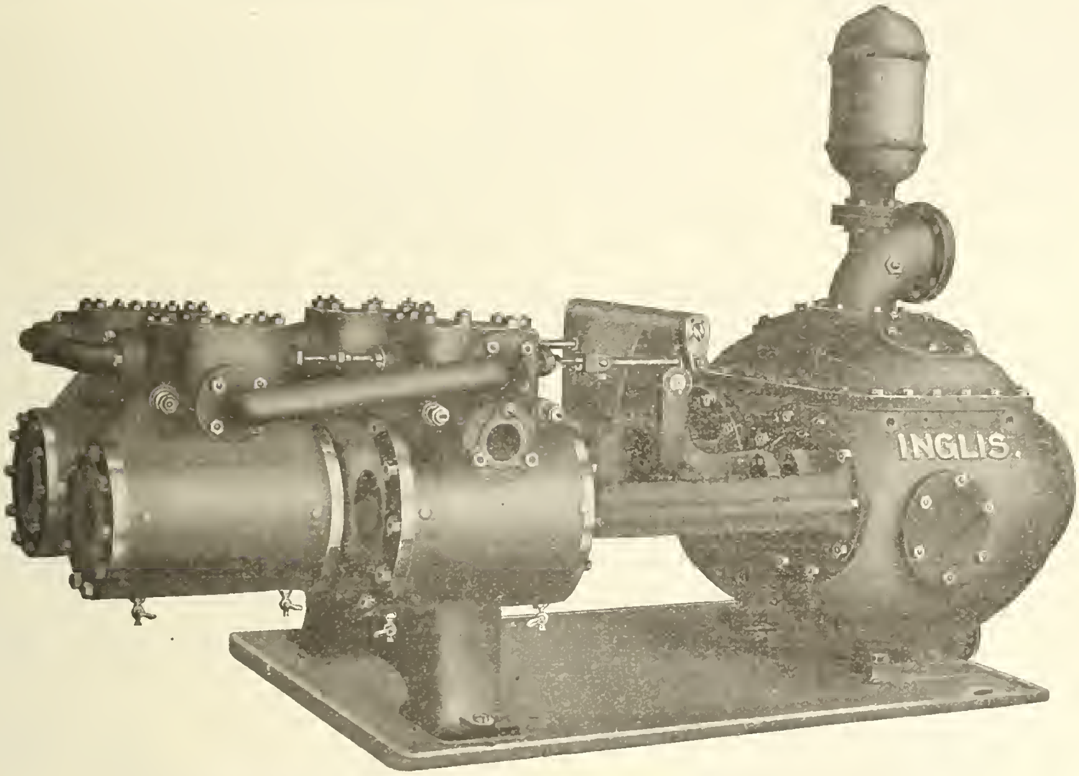
Tenders are open for warehouse, cost $20,000, W.S. Bay street, for Bachrack Co., Ltd., Bay street. Architect, A. R. Denison & Stephenson, 20 King street west. Tar and gravel roofing, structural steel, cut stone, Ohio blue sandstone, sidewalk lights, hardwood finish and flooring, metal sash, plate and art glass, galvanized iron cornice, ornamental iron, passenger elevators, four storeys and basement.

Plans are complete for alterations to five stores, cost $9,000, 401-5 Queen st.

(Continued on page 68)

Water-Works Plants

for Towns and Cities



"Inglis" 1,000,000 gall. Pumping Engine.

Our long and successful experience in the building and installation of Pumping Engines and Water Works Machinery should be a strong argument in favour of "Inglis" products. During the fifty-two years (52) our plant has been in operation, we have built many Pumping Engines, all of which have given entire satisfaction.

Capacities from one to thirty million gallons per 24 hours.

Send us your inquiries.

The John Inglis Company

Limited

Engineers and Boilermakers

14 Strachan Ave., TORONTO, Canada

west, for S. Levinter, 435 Queen street west. Architect, C. F. Wagner, 15 Toronto street. Brick, felt and gravel roofing, electric wiring, structural steel, freight elevator, carpentry and plastering.

Tenders are open for three-storey addition to chocolate factory, 277 Gladstone ave., for Wm. Neilson Co., 277 Gladstone ave. Architects, Chadwick & Beckett, 18 Toronto street. Brick and stone, tar and gravel roofing, vacuum steam heating, electric light, structural steel, Roman stone, fire escapes, concrete, freight elevators, wrought iron anchors and ties. Tenders called for brick work January 31st. Other tenders called February 3rd.

H. P. Baird, 525 Huron street, is excavating for stores and apartments, $10,000, N.E. Cor. Bloor and Howland ave. Architect, J. H. Stanford, 17 Westmoreland ave. Tar and gravel roofing, hot water heating, electric light, structural steel, cut stone, mantles, fire escapes, hardwood finish and flooring, stucco, concrete, burlap, galvanized iron cornice, plate and art glass, refrigerators.

Victoria, B.C.

Plans are being prepared for store and apartment, for George Bell. Architect, Thos. Hooper, 1108 Government street, Victoria. 60 x 120, brick, stores on ground floor and ten apartments on upper floors.

Plans have been prepared for office and store building, Douglas and Fort streets. Architect, Thos. Hooper, 1108 Government street, Victoria. Seven storeys, reinforced concrete, barber shop in basement, stores on ground floor, offices on upper floors fitted up for physicians and dentists.

Negotiations have been opened with council through Leeming Bros., 524 Fort street, in regard to location of railway spur and site for the Swift Canadian Company of Chicago, who are planning to locate here. Decision deferred.

Vancouver, B.C.

Plans have been filed for store and apartments, Hastings St. and Hawkes Ave. Architect, Otto Meberg, 36 Flack Bldg., Vancouver. Three stores, full basement, 45 rooms, hot and cold water in each room, hot water heating. Tenders will be called shortly on general contract.

Plans are being prepared for store and office building, cost $450,000, Granville and Georgia streets, for H. Birks & Son, jewellers, St. Catherine street, Montreal. Architects, Somervill & Putnam, Pacific Building, Vancouver. Ten storeys, 100 x 120 feet, steel, concrete, terra cotta facings, tile and probably Missisquoi marble, steam heating, elevators, one freight and four passenger. Ground and hall floors of terrazza; metal door and window frames. Work to start in June.

Plans are completed for hotel, cost $100,000, Keefer and Gore, for Mrs. Walter Sanford, c/o Empress Theatre. Architect, Hugh Braunton, Exchange Bldg. Vancouver. Six storeys, 60 x 122, brick and mill construction, first two floors of stone, granite bases and buff pressed brick with terra cotta quoins, terrazzo flooring, electric elevators, iron fire escapes, overhead system of heating, hot and cold water in all rooms, six stores on ground floor. Owner will let contract to selected contractors.

Windsor, Ont.

The Toledo Computing Scale Company are contemplating the erection of a factory building, Sandwich street w. Edwin Lee, Manager. Three or four storeys, 100 x 100, electric plant in connection, to furnish power to tenants. Sketches are being prepared by Crane & Pennington, Windsor.

Plans are prepared for boiler house, cost $2,500, for Hupp Motor Co.; W. M. Bamford, manager. Architects, Crane & Pennington, Windsor. One storey, 24 x 34, brick, concrete foundation, Prepared roofing, boiler and engine room. Tenders received by architects after February 1st. until Feb. 10th

CONTRACTS AWARDED

Brantford, Ont. (Mohawk)

Work is about to begin on the erection of a blacksmith shop, cost $6,000, for Adams Wagon Co., Ltd., Brantford. Architects, Taylor & Taylor, Brantford. General contractor, W. E. Faulkner, Brantford. Two storeys, 60 x 60, brick, concrete foundation, electric lighting, tar and gravel roofing, pine interior finish, steel columns, I-beams. Contract let January 25th.

Machine shop, cost $7,500, Mohawk street, for Adams Wagon Co., Ltd., Brantford. Architects, Taylor & Taylor, Brantford. Builder, A. E. Faulkner, Brantford. Two storeys, 80 x 82, brick, concrete foundation, electric lighting, tar and gravel roofing, pine interior finish. Contract let January 24th. New building or extension to present works. Woodworking machinery required.

Calgary, Alta.

A permit has been applied for to erect store and apartments, cost $15,000, 10th ave. west, for G. W. Chittich, 815 10th ave. west, Calgary. General contractor, J. B. McIntyre. Two storeys, 50 x 55, brick veneer, concrete foundation, steam heating, electric lighting, tar and gravel roofing.

Hamilton, Ont.

Alterations to hotel, cost $5,000, for Fred Hubert, proprietor Schmidt Hotel, Jarvis street north. Contractor, S. Howard, 231 Mary street, Hamilton, will do masonry. One storey to be added; interior fittings required later.

Addition to brew house, cost $25,000, Bay street north, for Hamilton Brewing Association; S. B. Cunningham, manager. Architects, Stewart & Witton, 2 Hughson street. General contractor. Geo. E. Mills, 614 King street east, Hamilton. Contract includes new cold storage plant, insulation, cooling apparatus, etc.

Montreal, Que.

Re-building shoe factory, cost $10,000, 331 Demontigny street, for Reformatory School, 341 Demontigny street. Tenants, Tetrault Shoe Manufacturing Co. General contractor, Joseph Trudel & Co., Letourneux ave., Maisonneuve.

Store and residence, cost $4,500, Lasalle ave., for R. H. Larin, 203 First ave., Montreal. Architect, C. Reeves, 58 St. James street, Montreal. General contractor, A. Marchessault, 207 Desjardins street, Montreal. Work is not started yet.

Ottawa, Ont.

A permit has been granted for alterations and extensions to brewery, for Capital Brewing Co., Ottawa. Architect, W. E. Noffke, Central Chambers, Ottawa. Contractor, S. Smith, Ottawa.

Vancouver, B.C.

Store and apartment bldg., cost $60,000, for Seabold & Roberts. Architect, Hugh A. Hodgson, Carter- Cotton Bldg., Vancouver. Contractors, R. McLean & Company, Pacific Bldg., Vancouver. 5 storeys and basement, brick, 50 x 120, steam heating, three stores, 108 rooms, hot and cold water in each, facing of Clayburn buff brick, tile entrances, marble stairs. General contractors will take figures on sub-contracts with the exception of heating, plumbing and painting, which the architects will let.

Victoria, B.C.

A permit has been granted for addition to office building, $32,000, for D. Irving. Architect, W. Ridgeway Wilson, 323 Pemberton Block, Victoria. Contractors, Parfitt Bros. & Co., 2303 Fernwood avenue, Victoria. Four storeys to be added for use as offices.

Hotel, cost $112,000, N.S. Johnson st. Interested, Chas. Hayward and F. S. Barnard (St. James Limited). Architects, Breseman & Durfee, Sayward Bldg., Victoria. Contractor, Westholme Lumber Company. Six storeys, 60 x 100, reinforced concrete, pressed brick, elevators. Plumbing, heating, wiring and elevators let separately by architects.

Grant & Lineham are excavating for stores and apartments, cost $62,000, Douglas and Cormorant. Contractors, Victoria Home Construction & Investment Co., formerly Murray & McKinney, Times Block, Victoria. Three-sty., pressed brick and terra cotta, 90 x 120, hot water heating, vacuum cleaning, 66 rooms for lodgers, 7 stores on ground floor. Building to be completed by July 1st, 1912.

Power Plants, Electricity and Telephones

Brampton, Ont.

The town contemplates installing motors for driving turbine pumps for use with Hydro power. Waterworks Commissioner, Dr. G. Roberts, Brampton. J. Beck, Chairman Hydro-electric Commission.

Hamilton, Ont.

Engineer E. I. Sifton, City Hall, has been instructed by Hydro-electric Department to prepare specifications for year's supply of meters and transformers. Tenders to be called shortly.

Lethbridge, Alta.

Tenders are called until February 15th for extension to power house. G. W. Robinson, secretary. General Power Superintendent, A. Reid, Lethbridge Construction of extension. Plans, etc., with superintendent.

North Batlteford, Sask.

Engineers, Chipman & Powers, Toronto and Winnipeg, have been appointed to prepare plans for the enlargement of the electric lighting plant here.

Portage la Prairie, Man.

The waterworks plant and the city electrical plant may be combined. Estimated cost, $10,000. Nothing definite decided until the contract to take power

(Continued on page 70)

TURBINE PUMPS

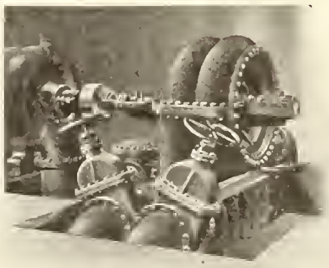
for Water Works Purposes

In Water Works practice it is necessary to provide for two pressures, one domestic and the other higher for fire service. For this purpose we offer our

Patented Double Suction

By an ingenious application of the double suction it is practicable to operate the same pump at either fire or domestic pressure and yet maintain a constant speed. The recent addition to the waterworks at Lachine shows how this end is attained.

The unit consists of a 14-inch 2-stage turbine pump of capacity of 5,000,000 Imperial gallons per 24 hours driven by either a 400 horse power motor or a 400 horse power steam turbine at 1,200 r.p.m. For ordinary domestic purposes a pressure of 80 lbs. is sufficient and this is obtained by closing one valve and therefore operating one stage of the pump, changing it in fact to a single stage pump. For fire service both stages are used and a pressure of 110 lbs. can be maintained. The speed, however, remains the same for both services. The exclusive rights to this double suction for Canada are owned by



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Sales Offices: MONTREAL TORONTO COBALT WINNIPEG CALGARY VANCOUVER

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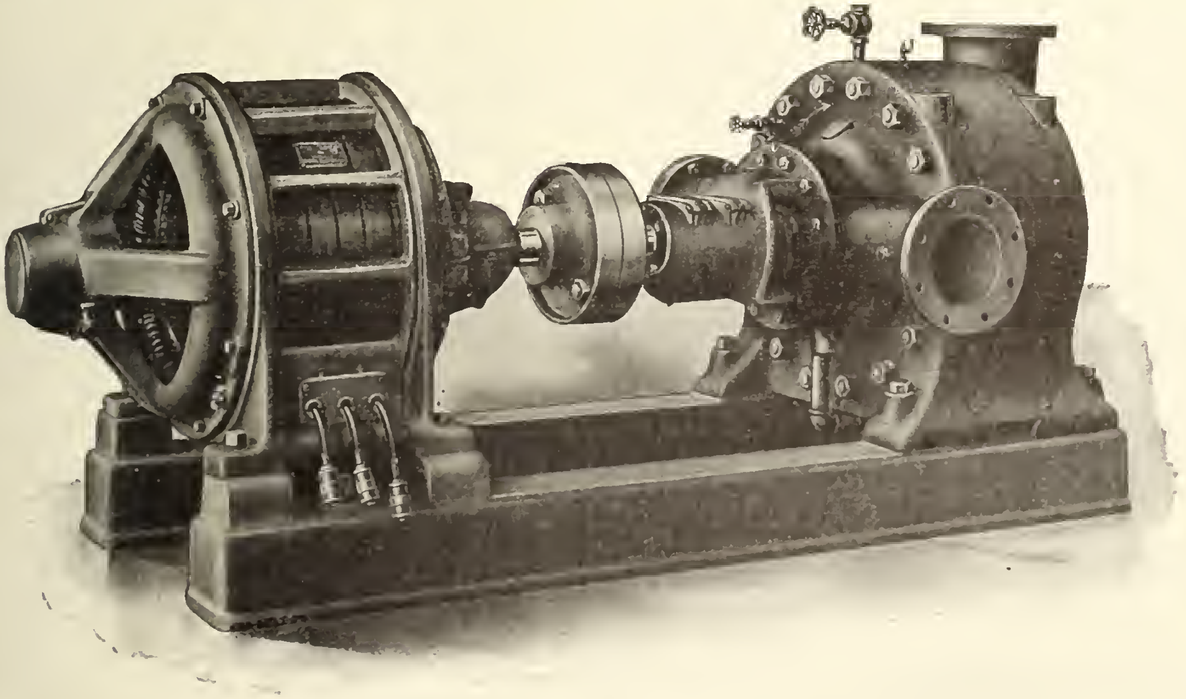

CANADA FOUNDRY COMPANY, Limited

TORONTO MONTREAL HALIFAX OTTAWA COBALT WINNIPEG CALGARY VANCOUVER NELSON

from the Great Falls Power Company of Winnipeg is settled. Mayor, J. J. Garland. City Clerk, F. W. Clayton.

The Great Falls Power Co., of Winnipeg, C. Chamberlain, engineer, will build a transmission line from Winnipeg to Portage la Prairie if the town will contract for 1,000 h.p. for 30 years. The company will buy power from the Winnipeg plant, transmitted at 60,000 volts and stepped down to 2,300 volts. Line to be ready for operation by August 1st.

Quebec, Que.

A contract for ten years has been given by City of Labrador Electric Company for electric lighting. A Hydro-electric plant and steam auxiliary will be completely equipped.

St. Pacome, Que.

River Ouelle Pulp and Lumber Company wish to get in touch with a manufacturer who can furnish a lighting plant for logging camps which they intend locating where water power is not available. A plant generating electricity and one which can be run without the services of a competent engineer on a storage battery is desired. W. Gerard Power, manager and secretary, St. Pacome.

Toronto, Ont.

The Mexican Interurban Electric Co., Ltd., a $5,000,000 corporation, will make Toronto their head office. Z. K. Lash, Bank of Commerce Bldg., Toronto.; Dr. Pearson, of New York, interested.

Miscellaneous

Brandon, Man.

Tenders are called unitl March 8th, for civic supplies for 1912: Sewer pipe: salt glazed and vitrified, 36-in., 38-in., 24-in., double strength; 15 12, 10 x 8-in. Standard strength; water pipe: 10, 8, 6 and 4-in. for 300 ft. lead. brass goods: curb cocks, ½, 1, ¾ and ½-in.; corporation cocks, 1. ¾ and ½-in.; check valves. ½, ¾ and 1-in., 3 way branches ½ x 3, 1. inch; 2-way branches ¾-in. to ½-in, all threads to be for Muller Tapping machine. Lead pipe: 1½-in., 1-in. and ¾-in. and ½-in. for 100 lbs. pressure.

Chatham, Ont.

Fire Chief Pritchard recommends the purchase of more fire hose, smoke helmets, hose couplings, fire extinguishers and new fire hall. The matter has been referred to council.

London, Ont.

The citl of London has approved the purchase of fire apparatus: aerial ladder truck, combination auto truck, capable of carrying 10 men; fire chief's auto; new fire alarm indicator; 2 new gongs, 350-ft. of lightweight hose. Tenders will be called at once. Chairman No. 3 Committee in charge, W. D. Wright. Fire chief, Aitkin.

Ottawa, Ont.

Tenders are called for civic supplies for 1912. Special pipe castings; plank and cedar, valves, sandstone blocks, waterworks supplies, (brass fittings), broken stone, brick, cement, castings, c. i. pipe, hydrants, hardware, sand, oils and grease, lead pipe and pig lead. Received by secretary, Board of Control, until 4 p.m., February 13th. City Engineer, N. J. Ker.

Fire Chief Graham, Ottawa, recommends to County Council an inspection of Court House, the purchase of twelve chemical fire extinguishers, also the purchase of fireproof cabinets and the reconstruction of floors in cement.

Victoria, B.C.

Fire Chief Davis recommends the ordering of new fire apparatus, a motor combination hose and chemical engine, one double 80 h.p. chemical engine; two 80 h.p. chassis; 12 additional fire alarm boxes. Purchase price, $35,000, which includes erection of new hall to be used jointly with Oak Bay. Tenders for apparatus will be called at once.

Business Notes

Bancroft, Ont.

On the 25th inst. the woollen mills, grist mill and machine shop owned by Fair & Sargent were destroyed by fire. Loss $8,000. E. Reid & Sons, operators of grist mill, lost $3,500 on machinery. The woollen mill of D. Fuller was also destroyed. Loss $5,000.

Chatham, Ont.

Several thousand dollars will be expended shortly in new bridges and for new roads in Kent County. Donald McColl is chairman of the comittee which will deal with the matter.

Ethel, Ont.

The flour mills here owned by I. W. Henley were destroyed by fire on the 15th inst. Loss $7,000.

Farnham, Que.

Main Building of Holy Cross College destroyed by fire on January 29th. Loss estimated at $100,000. Insurance, $80,000.

Grand Forks, B.C.

Fire destroyed the Masonic Temple; loss $50,000; the A. B. Rhinehart hardware store, $15,000, and M. Fishman clothing store, $12,000.

Halifax, N.S.

On the 1st inst. the sugar plant of Acadia Sugar Refining Co., Ltd., (Dartmouth side) was destroyed by fire. Loss estimated at one million dollars, which is stated to be covered by insurance.

Hull, Que.

The Hull Electric Railway Company, Hull, have purchased the MacDougall Chambers, 177 Main street. Additions and alterations will be made and latest office fittings and equipment required.

Lorne Park, Ont.

Mr. Laker's residence and farm buildings totally destroyed. Loss estimated at $12,000.

Montreal, Que.

On January 31st fire damaged to the extend of $25,000, premises at 40 St. George street, occupied by W. A. Wood, time clock manufacturer, L. E. Waters & Co., printers; the Stain Skirt Manufacturing Co., and the O'Donnell Skirt manufacturing Company.

On January 23rd fire damaged the Rideau Hotel in Jacques Cartier Square Prop., Ex-Ald. J. A. Tauquay; loss estimated at $75,000, also the Richilieu Hotel on St. Vincent street, proprietor, A. L. Hurtubise. Loss estimated at $50,000.

Woodworking factory of Shearer, Brown & Wills, Ltd., 225 N. Patrick st., destroyed by fire on the 29th inst.

Fire damaged office and warehouse of Hobbs Manufacturing Company, plate glass manufacturers, 71 William street, Montreal. Head office, London, Ont. Loss $25,000.

The Christian Brothers' school, cor Cote and Lagauchetiere streets, wa damaged by fire on the 29th inst. to the extent of about $6,000.

Building, Delormier ave., near Ontario street, occupied by Dominion Cocoanut Butter Co., Scout Shoe Co., and the Puravana Cigar Mfg. Co., damaged by fire and water. Estimated damage, $35,000, mostly on laundry.

St. Boniface, Man.

Steel plant on Seine River, of the Winnipeg Steel Granary & Culvert Company, Limited, burned; W. H. Hamilton, manager, 39 Purcell ave. Estimated los $15,000; covered by insurance. Firm are preparing to enlarge and machinery will have to be replaced.

Trenton, Ont.

Fire gutted the Opera House; loss $10,000; also City Steam Laundry, loss on machinery, $1,000; and elevator owned by J. G. Squier, loss $1,000.

Woodstock, N.B.

The Queen's Hotel and stables, and Miss Kate Stephenson's boarding house were destroyed by fire.

Vancouver, B.C.

A syndicate headed by J. Coughlan & Sons, structural steel manufacturers, of this city, have purchased New York block on Granville street and their intention is to pull down same on expiration of lease and erect a large office building to cost $60,000.

New Companies

The Manitoba Prospecting Co., Ltd., has been incorporated with a capital of $100,000, to deal in brick, tile, clay products, lumber, stone and all other building materials and supplies, the head office to be at Winnipeg, the incorporators are: L. McMeans, N. J. Black and Wm. Bruce, all of Winnipeg.

Walsh County Realty Company, Ltd., has been incorporated with a capital of $100,000, to deal in lands, timber and timber limits, etc., with head office at Winnipeg, the incorporators are: J. C. Risvold and J. Flekke, both of Grafton, and E. R. Chapman, of Winnipeg.

G. Delisle, Limitee, has been incorporated with a capital of $20,000, with head office at Chicoutimi, Que., to carry on business as general contractors. The incorporators are Gustave Delisle, Victor Warren, and Jos. Gagnon, all of Chicoutimi.

Ritchie-Shelton Lumber Company has been incorporated with a capital of $20,000, to operate mills for the manufacture of lumber, shingles and timber products, to deal in timber lands and to carry on a general lumber, timber and logging business in all its branches, the hea office is at Vancoucer and Arthur M Whiteside, solicitor, is the attorney.

Brooks-McKenzie Company, Limited, have been incorporated with a capital of $25,000, to carry on business as sawm proprietors, timber merchants and lumbermen in all its branches, head office is to be at Penticton, B. C.

Metropolitan Investors and Contractors, Limited, has been incorporated wit a capital of $250,000, to carry on a general construction and real estate business, with head office at Vancouver, B C

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Hoisting Machinery

ever published in Canada.

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If you are interested in these goods drop us a line, so we may mail you one of these fine catalogues. You will not be sorry.

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Makers of Hoisting Machinery
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Galvanized Cornice

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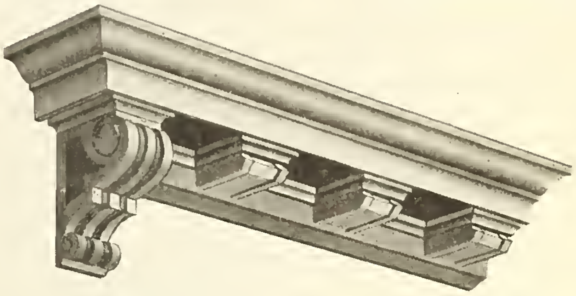

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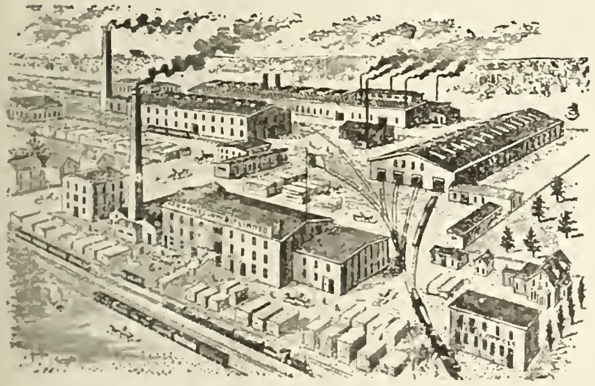

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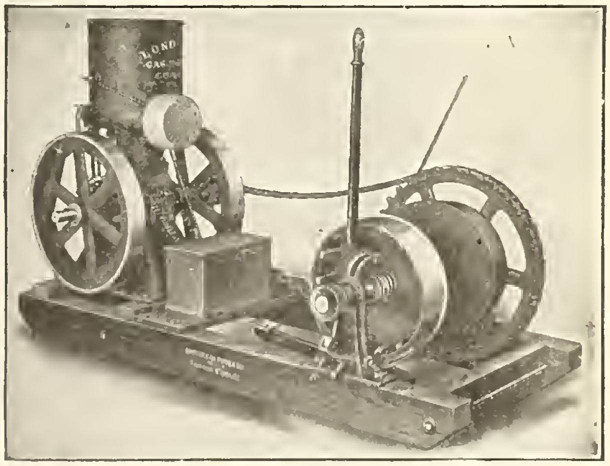

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"London" Friction Clutch Hoist

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This hoist can be used with any make or style of gas, gasoline or oil engine

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Span, 870 feet. Working Load, 10 tons. Main Cable 8½" circ. Breaking Stress of Main Cable, 275 tons.
Main Cable supplied by THOS & WM SMITH LTD., Newcastle-on-Tyne.

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For CONTRACTORS' WORK, such as BLONDINS, CRANES, INCLINES, BALLAST ROPES,
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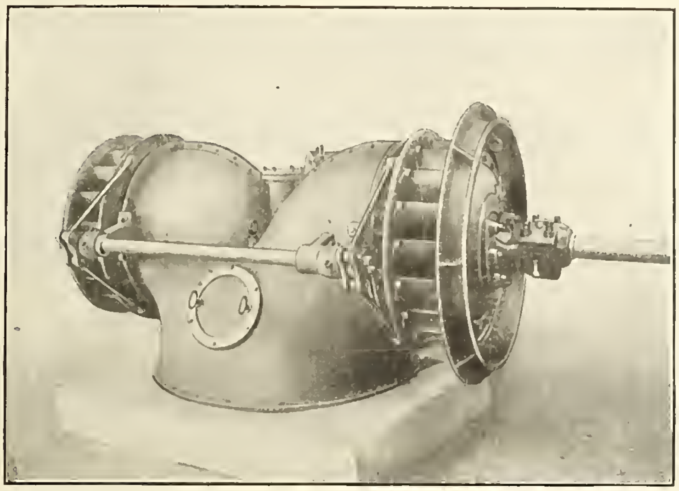

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are invited to visit the International Clay Products Exposition in the Coliseum, Chicago, March 7th to 12th inclusive.

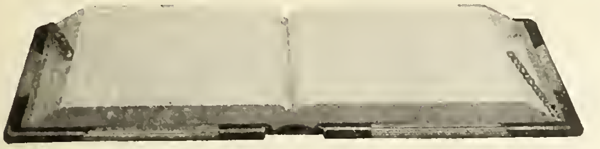
The entire Coliseum and annex will be given over to a display of clay products, ranging from porcelain art ware to brick and tile and heaviest vitrified sanitary sewer pipe.

Practical demonstrations and tests—the kind that will appeal to the man having to do with city sanitation—will be given every hour of the exposition. An instance : A complete sewer will be built under a full sized brick paved street, showing every connection and detail from the model porcelain bath room to the vitrified sanitary sewer pipe and to the main sewer. Trenchers and excavating machines, pumps to remove the surplus water—every modern method of sanitary sewer construction will be shown in actual operation.

Engineers, contractors and city officials are requested to send their addresses for programmes of addresses by eminent sanitarians and booklets regarding the exposition.

THE INTERNATIONAL CLAY PRODUCTS EXPOSITION

The Coliseum, Chicago, March 7-12, Inclusive



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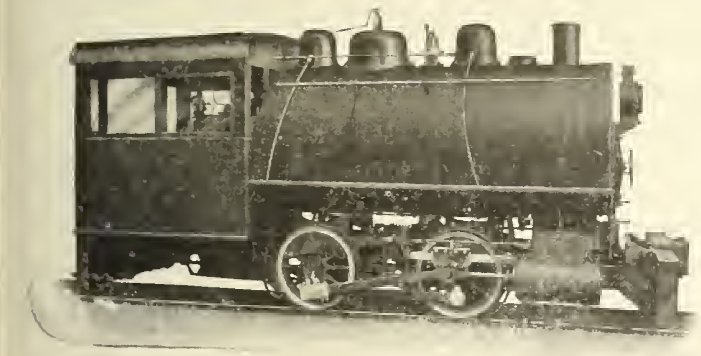

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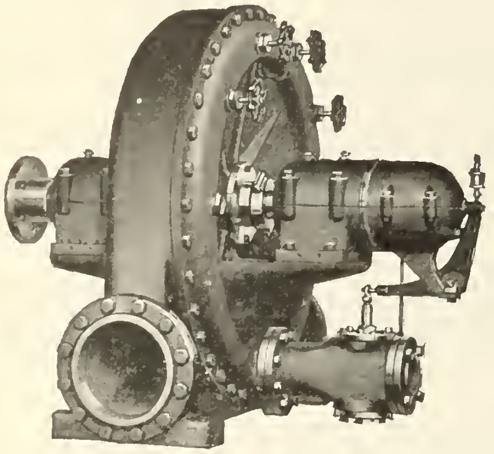

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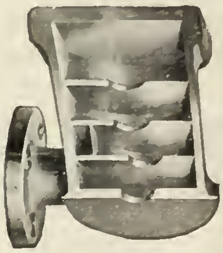

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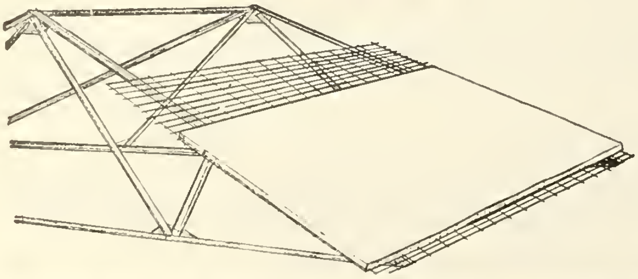

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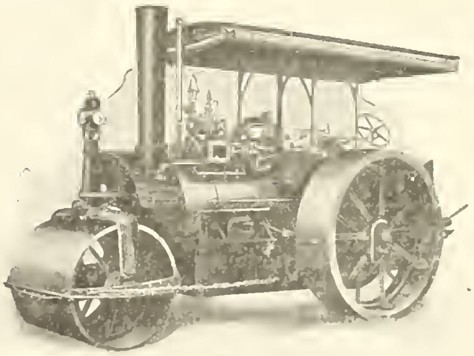

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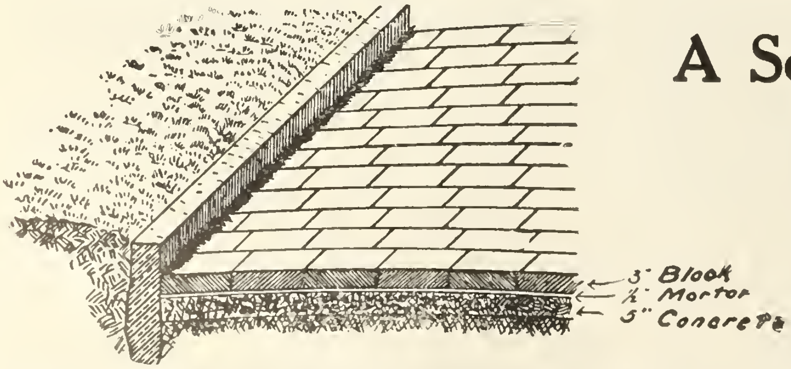

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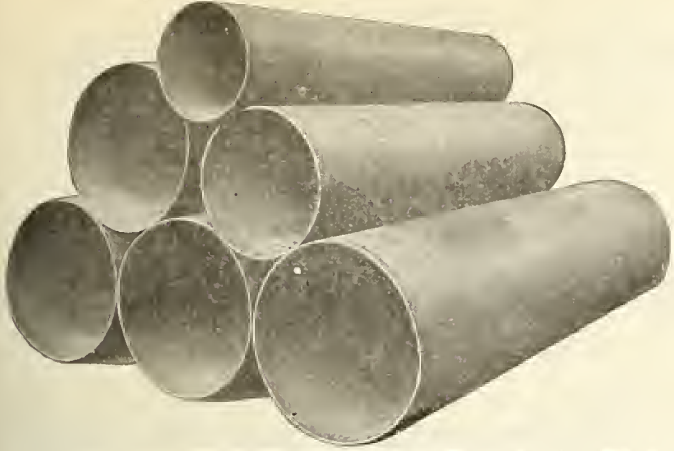

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A Stucco or concrete house needs protection with the original

BAY STATE

BRICK AND CEMENT COATING

The coating prevents discoloration or cracking from moisture and does not destroy the pleasing texture of the concrete or stuc It has been endorsed by the National Board of Fire Underwriter as a fire retarder and is a perfect protection as well as a beautiful tint for the exteriors or interiors of residences, hotels, garages, factories and mills.

ON FLOORS it stands wear and washing and does not disintegrate. Let us send you a book which tells all about it and a list of the well known homes, hotels, mills and factories on which it has been used. Address, mentioning this medium.

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82-84 Washington St., - - - Boston, Mass.

Fred Holmes, President C. P. Holmes, Sec'y-Treas.

Telephone North 663

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The Des Moines Hemispherical Bottom Steel Tanks and Towers

have been used and approved by nearly all leading Engineers. They are undoubtedly the most economical means of storing water at an elevation.

We have built many of these in Canada the United States and Mexico.

Estimates cheerfully furnished.

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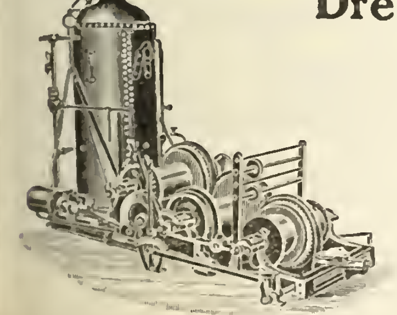

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Manufacturers of **STEEL** For Reinforcing Concrete.
Plain Rounds, Squares or Twisted Squares.
Cross Arm Braces, plain and galvanized.

ANGLES from ¾ x ¾ in. up to 2 x 2 ins.
ROUNDS and SQUARE from ⅜ in. up to 1¼ ins.

We can ship from stock

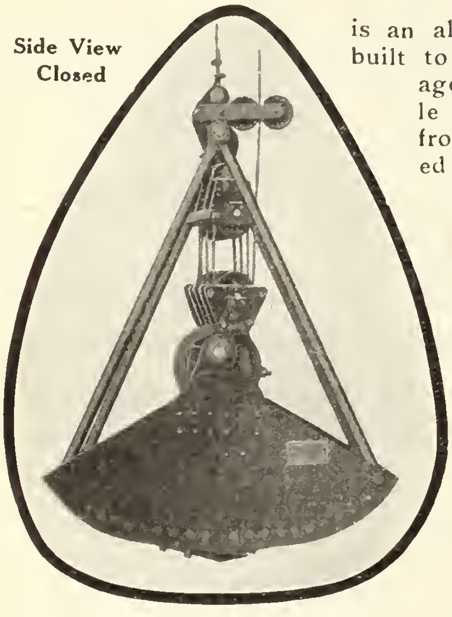
FLATS from ¾ in. up to 4 ins. in width, and other special sections.

Ask us for prices—they will interest you.

Office and Works : Sherman Ave., North

The Owen Bucket

Side View Closed



is an all round bucket, built to stand hard usage. It will handle any material from sand to crushed rock.

The Owen Bucket will dig like a steam shovel and is provided with detachable teeth for dredging.

Write for our catalogue fully descriptive and a positive guarantee with every bucket.

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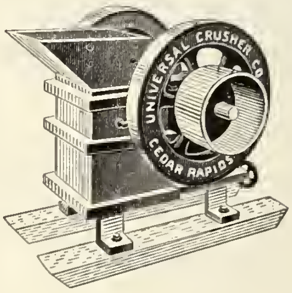
Because of its Forced Feed and Forced Discharge the Universal is SUPERIOR FOR FINE AND UNIFORM CRUSHING To Any Other Machine in the World.



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The forced feed action gives a maximum capacity, using **half the power** of other makes.

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30 day's trial to your heart's content **on any material.** If it should fail to do the work as agreed, your money cheerfully refunded. If you can suggest any fairer proposition, tell us what it is.

The Universal Will Save You Hundreds of Dollars

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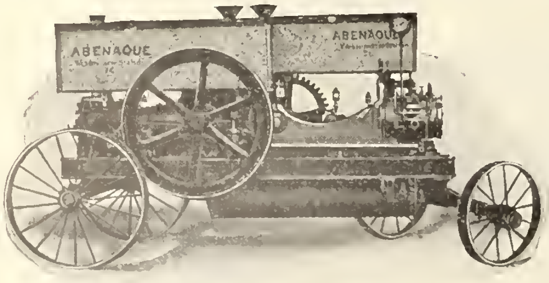

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PORTABLE AIR COMPRESSOR OUTFIT

is saving money for every contractor using it. Why not let it do the same for you? Let us talk with you regarding the cost of handling your work with one of our outfits.

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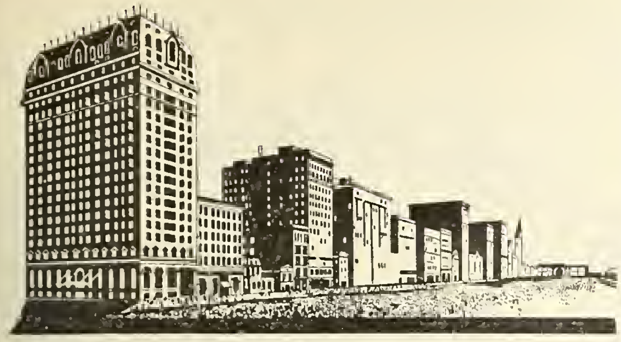

Building Record

West ahead of the East by a big margin in 1911—Toronto has safe hold on premier position.

BUILDING PERMITS FOR YEAR

	1911	1910
Toronto, Ont.	$24,374,539	$21,127,783
Montreal, Que.	14.561,481	15,815,859
Winnipeg, Man..	17,550,000	15,106,480
Vancouver, B. C.	17,652,642	13,150,365
Ottawa, Ont.	2,997,610	3,022,350
Hamilton, Ont..	4,255,730	2,604,605
London, Ont.	1,036,880	805,074
Halifax, N. S.	508,796	630,380
Calgary, Alta.	12,909,478	5,589,594
St. John, N. B.	572,700	526,435
Victoria, B. C.	4,026,315	2,273,045
Regina, Sask.	5,099,340	2,351,238
Edmonton, Alta.	3,671,850	2,159,106
Kingston, Ont.	314,569	220,092
Maisonneuve, Que. ...	2,260,160	1,955,100
Peterboro, Ont.	345,372	517,958
Windsor, Ont.	739,575	392,040
Sydney, N. S.	495,642	347,554
Fort William, Ont. ...	3,078,010	2,381.125
Berlin, Ont.	358,095	347,550
Westmount, Que.	1,489,082	2,152,020
St. Thomas, Ont.	285,515	286,100
Brandon, Man.	1.043,929	982,385
Moose Jaw, Sask.	2,475,736	1,071,090
New Westminster, B.C.	1,058,400	
Saskatoon, Sask.	5,004,326	2,817,771
Port Arthur, Ont. .. .	597,705	892,681
Chatham, Ont.	233,000	....
Galt, Ont.	282,334	....
Belleville, Ont.	320,000	....
Woodstock, Ont.	143.200	82,000
Nanaimo, B. C.	152,611	....
Lethbridge, Alta.	1,033,380	2,211,310
North Vancouver, B.C.	772,468	....
St. Boniface, Man. .. .	1,140,735	861,870
Oshawa, Ont.	120.000	179,500
Strathcona, Alta.	491,403	363,470
Medicine Hat, Alta. ..	743.532	205,640
Welland, Ont.	342,808	245,942
Nelson, B. C.	166,700	163,430
	$131,886,775	$102,819,242

These figures show a gain of 28.2 per cent. over 1910. They give some idea of what we may expect this year. If you manufacture or sell anything that enters into the construction of buildings you should write to MacLean Daily Reports Limited, 220 King Street West, Toronto, and learn how they can help you help yourself. Their organization thoroughly covers the Dominion, and supplies news economically and efficiently, or present and prospective markets for the goods their subscribers sell. If requested they will gladly send specimen reports and rates and outline facilities for serving you.

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"Renfrew" Lime

That is why it will pay you to use it in place of some inferior brand. We have been established for twenty-five years, and are still growing, and why? Because "RENFREW" LIME simply CAN'T BE BEATEN.

Always Use

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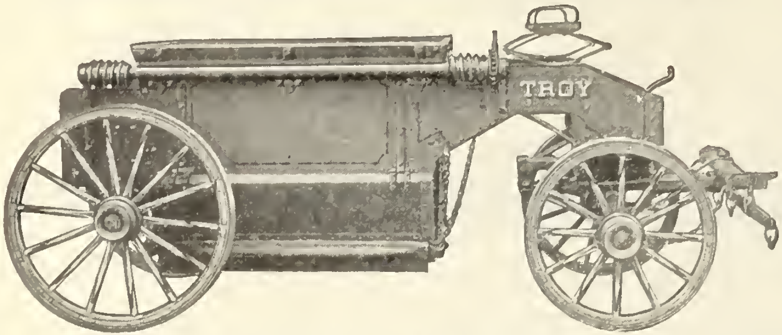
Jamieson Lime Co.

RENFREW, ONTARIO

White Lime - Stone - Grey Lime
Brick - Drain Tile

January 1st — Resolution Day



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Resolve to do your hauling cheaper than you did last year.

Use TROY Specials and get your costs down to rock bottom. Your teams can make more trips—the Special is lighter running. Your men can load it quicker—it's lower down. And it never can get out of order. The price is **Right.**

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Canada's Pioneer and Leading Concern in the Marble Business

They will sell you Quarry Blocks, Sawn Marble, Marble completely finished for either interior or exterior purposes, and, if necessary, they will contract to set it in place.

Samples may be seen at District Sales Offices:—

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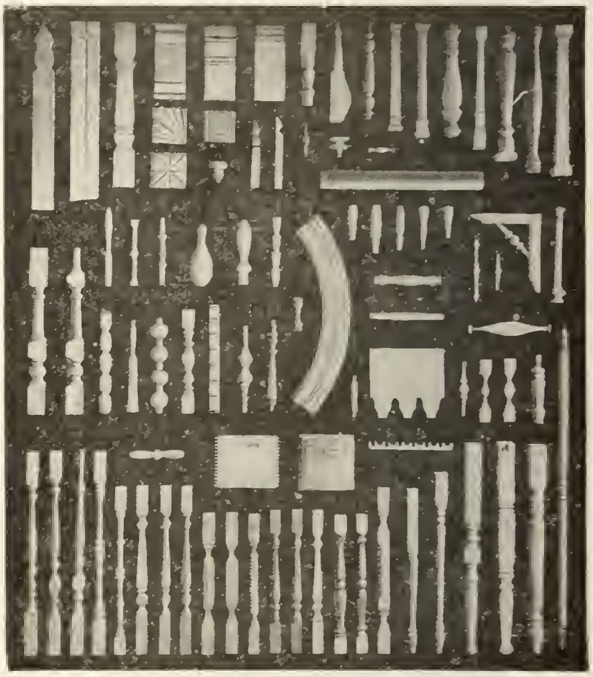
Bosse & Banks	Quebec, Que.
General Contractors Supply Company, Ltd.	Halifax, N. S.
129 Sparks Street	Ottawa, Ont.
James Robertson Co. Ltd.	St. John, N. B.
G. R. Duncan	Fort William, Ont.
Walker & Barnes	Edmonton, Alta.
The Ritchie Contracting & Supply Co. Ltd.	Vancouver, B. C.
315 Coristine Building	Montreal, Que.



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Enamelled Woodenware, Dowels, Mailing Boxes, Pill Boxes, Pail Handles, Broom Handles, Paper Plugs, Knobs, and Turnings of all kinds

Enquiries Solicited

Automatic Wood Box and Turning Co.
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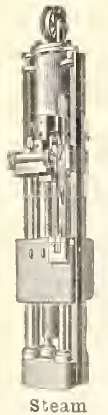
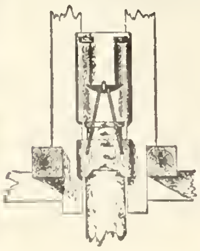
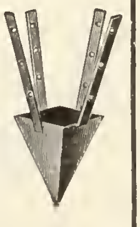


Steam Hammer



Casgrain Pile Cap

Perfect Head Block



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Give results which are not obtained by the ordinary Face Brick.

The advantages to be gained should be considered by the prospective builder. Write us.

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The Browning Locomotive Cranes are

Reliable, Durable, Economical and Accessible

In the end a Browning Crane will cost you less than ordinary labor and will have accomplished more.

They are built for the heaviest lifting, such as logging, contractors work, etc., and perform their functions with the greatest of ease.

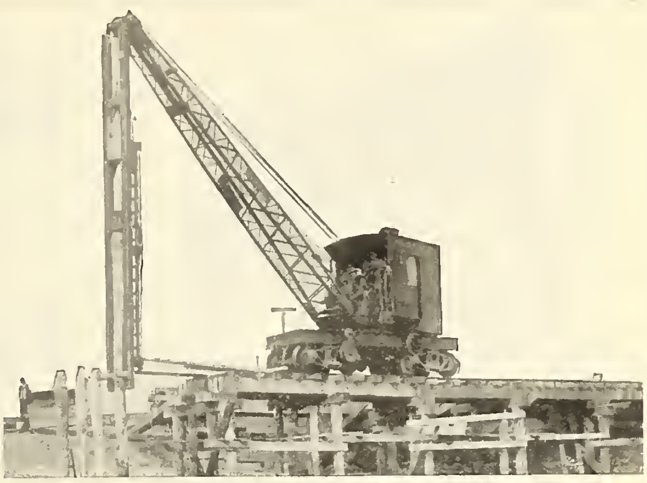
INSTALL A BROWNING CRANE

and it will bring you surprising results.

Remember it will save you money. Write for illustrated catalogue and full information.

The
Browning Engineering Co.
CLEVELAND, OHIO.

CRANES



Driving Piles with a
BROWNHOIST LOCOMOTIVE CRANE

The contractor himself made this device for driving piles with the crane. It was used on the N. Y., C. & St. L. R. R. The piles were 40 ft. long and driven 20 ft.

This is only one of the many uses of a Brownhoist locomotive crane on construction work. It is being used today for excavating, depositing concrete, handling sand, gravel, stone and heavy construction work, and switching the cars.

Our new illustrated catalog shows these operations on some of the largest construction work today.

Write for it, now.

The Brown Hoisting Machinery Co.
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It means the best Architectural Terra Cotta ever made.

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and all Colors, Glazed and Unglazed

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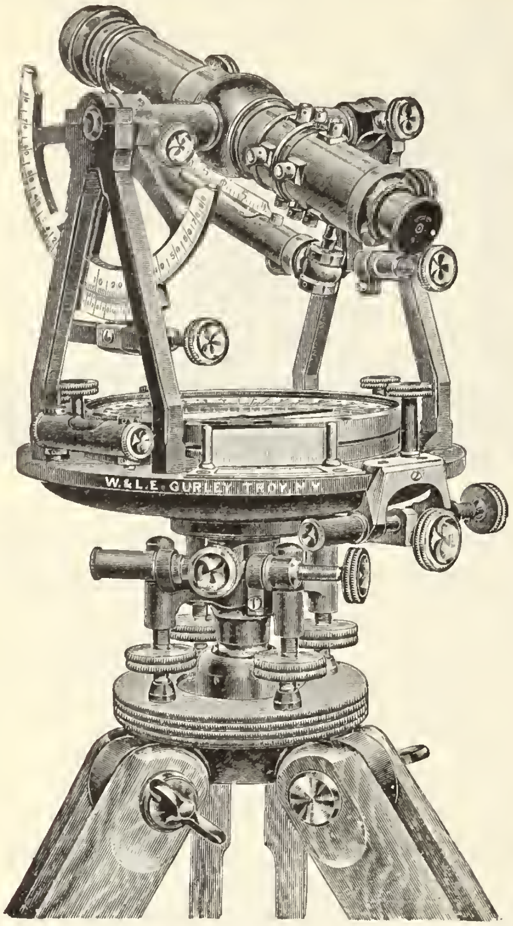
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1845 1912

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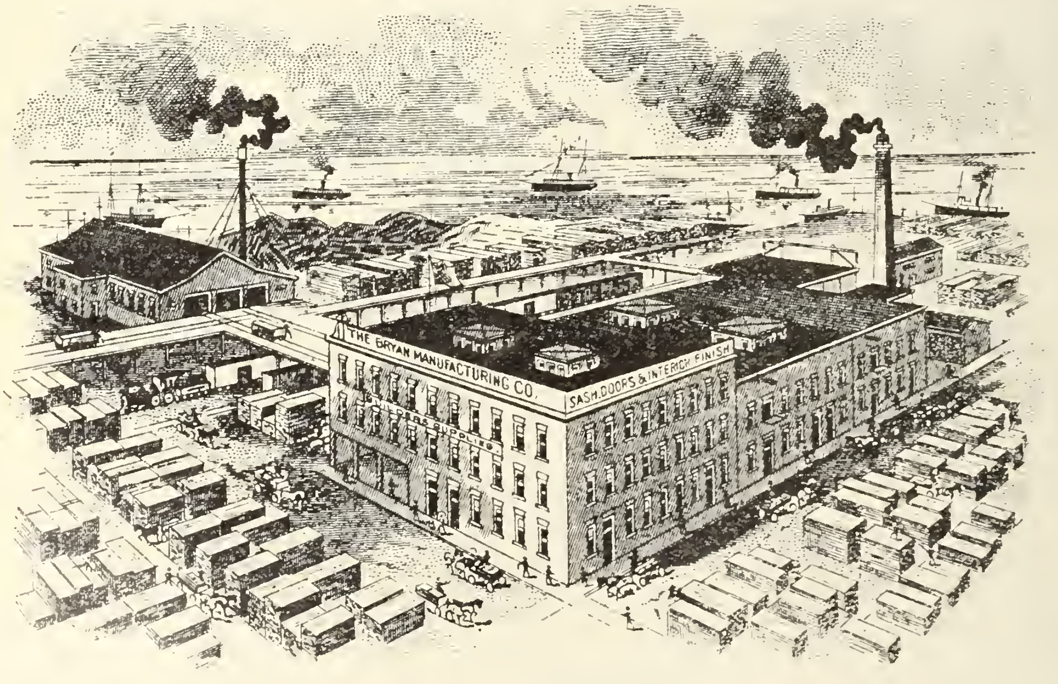

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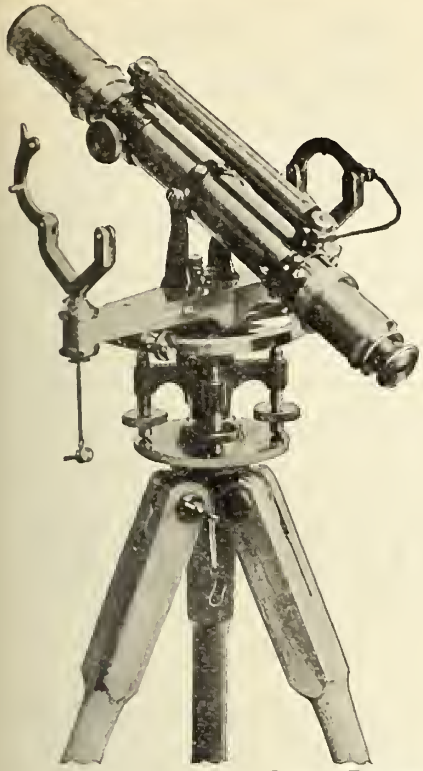

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A point about this level of great interest to architects and builders is this—A patent arrangement enables the operator to take ***vertical sight*** to the extent of 45 degrees in either direction, and also ***horizontal angles*** between two points not in the same plane. This is an additional feature that will be found extremely useful. The instrument is constructed with an adjustable horizontal bearing, making it rigid and accurate and preventing the telescope from overbalancing. This is a distinct improvement on other instruments of this kind. Price $58.00.

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All other sizes of Long Leaf Timber on hand, also White Pine, Oak, etc. 40 to 60 feet long Piling a specialty. No order too large, and inquiries solicited.

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Fire Clay
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Current Prices of Building Material.

BRICKS

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	Per B
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

		Star.	D.D.
10 to 25	united inches	$4.25	$ 6.25
26 to 40	"	4.65	6.75
41 to 50	"	5.10	7.50
51 to 60	"	5.35	8.50
61 to 70	"	5.75	9.75
71 to 80	"	6.25	11.00
81 to 85	"	7.00	12.50
86 to 90	"	...	15.00
91 to 95	"	...	17.50
96 to 100	"	...	20.50
101 to 105	"	...	24.00
106 to 110	"	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.50	$ 6.75	$ 5.25
40 u. i.	4.25	3.75	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts—Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 per cent.

No. 4 compression bath cock .... net $1.75

No. 4½ Fuller's .... net $2.35

Square head brass cocks, 65; iron, 65 per cent.

Boilers—Galvanized Iron Range

30 gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5¼ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)	Black.		Galvanized
¼ inch	1.80	¼ inch	2.57
⅜ "	1.80	⅜ "	2.57
½ "	2.35	½ "	3.23
¾ "	2.75	¾ "	3.83
1 "	3.93	1 "	5.48
1¼ "	5.35	1¼ "	7.49
1½ "	6.44	1½ "	8.98
2 "	8.05	2 "	11.46
2½ "	12.85	2½ "	18.30
3 "	16.86	3 "	24.03
3½ "	22.57	3½ "	33.65
4 "	25.65	4 "	35.90

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-nch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

Crushed stone, 2-inch, $1.30; 1-inch, $1.30; ⅜-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and leads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $3.00.

Manilla Rope, best, per pound, 16½ cents.

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(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $6.75 to $7.00 per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, 99c. per gallon of 9 lbs.

Raw Linseed Oil, in barrels, 96c. per gallon of 9 lbs.

Turpentine, in barrels, 73c. per gallon.

Pure Red Lead, dry, $5.50 to $6.50 per 100 lbs.

Established 1882
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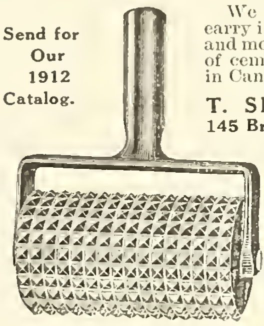

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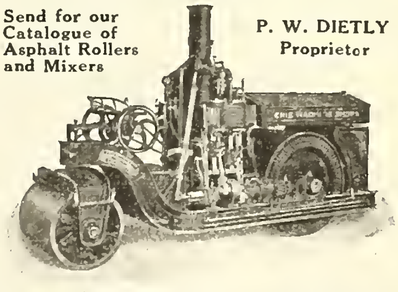

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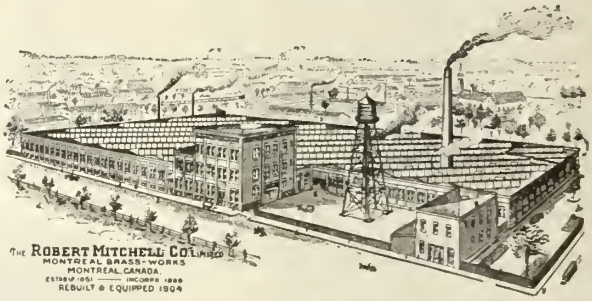

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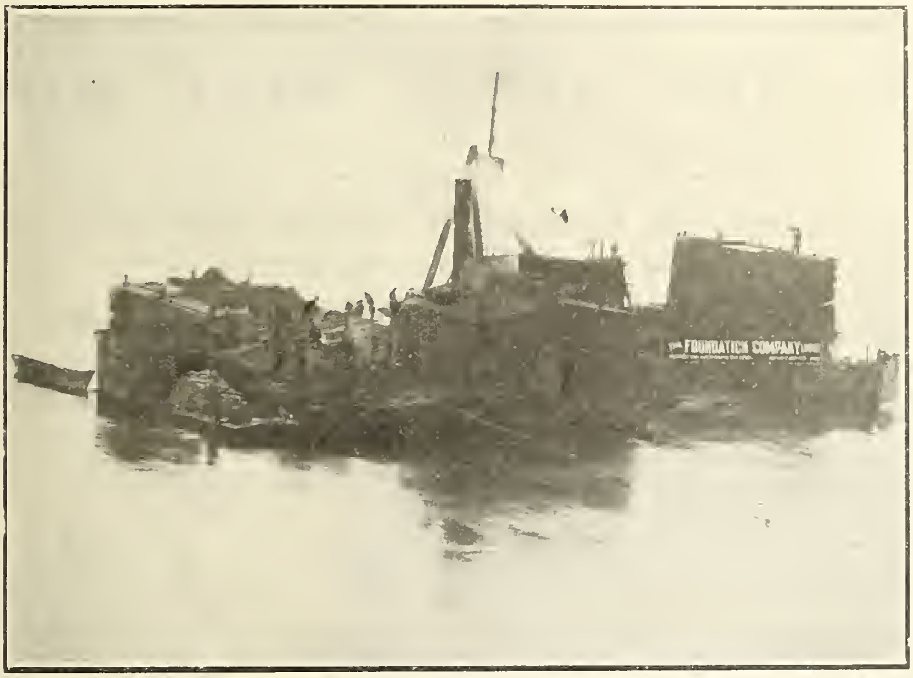

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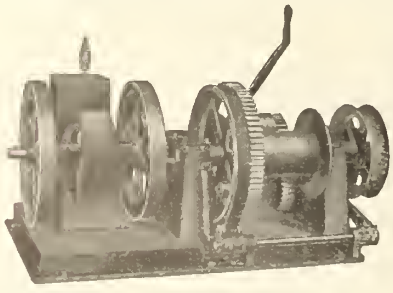

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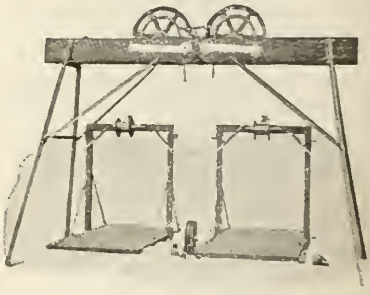

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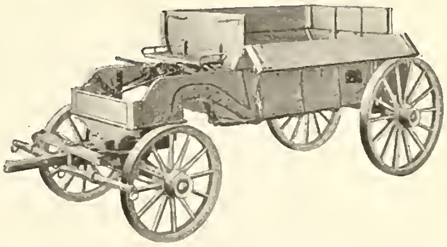

IT is well known that the biggest hardwood trees are disappearing. Nobody makes wagon side. boards out of one piece. Such wide lumber is not to be had.

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"IF we are to better conditions, we must realize that 'fireproof' is not 'fireproof' as it is understood today. The literal definition remains, but many crimes have been committed in its name. . . . . There is but one principle to fireproof construction irrespective of the kind of structure. To have fireproof buildings, architects and owners must throw aside precedent and eliminate the use of combustible and semi-combustible materials in their construction.

" . . . . If there were still an absolute necessity for its use, if it could not be replaced with steel, as it has been in many modern constructions, it would then be well to attempt to conceive of something better. I am opposed to the use of wood in any form in fireproof buildings and the law ought not to permit its use.

" . . . . To me there is a fascination about steel interiors. It constantly emphasizes the absurdity of fire-fighting, for how can fires rage if they have nothing to feed upon?"

Interviewed, Ex-Fire Chief Croker said: "You are at perfect liberty to use my talk partially or entirely and apply it to your products. I have watched your development since you first originated cold drawn steel interiors with great interest. I have nothing more to say. My address, and the fact that my private residence will be equipped throughout with The Dahlstrom Products is as strong a recommendation as I can make."

Ex-Fire Chief Croker's address has been done in booklet form. Copies may be had for the asking. "Buildings As They Should Be" clearly describes the elimination of all combustible materials in buildings. A copy may be had for the asking Send for it.

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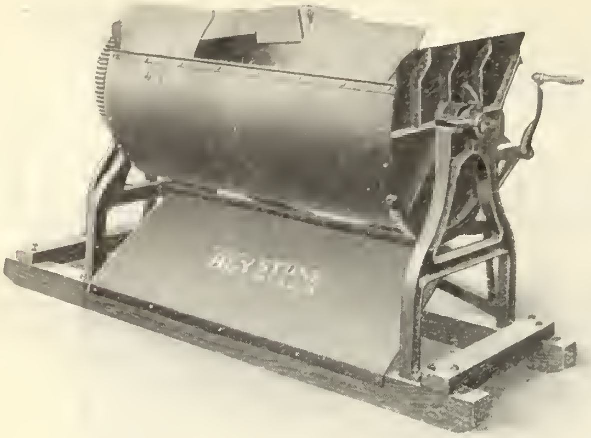

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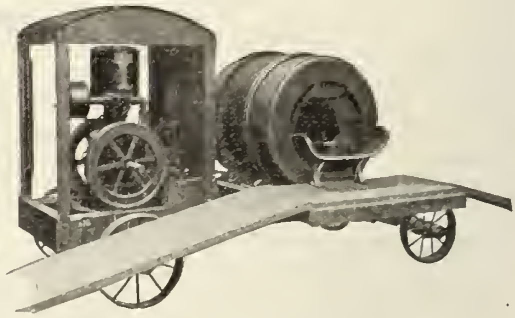
Figure all of this saving and the aggregate saving is so important that the greater economy must be evident to you.



First of all it charges only about 2 feet from the ground. There is no charging elevator required, no mechanism to operate a charging elevator, no extra man to attend it and no additional power required to operate it.
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Catalog No. 45 describes it. Shall we send the catalog.

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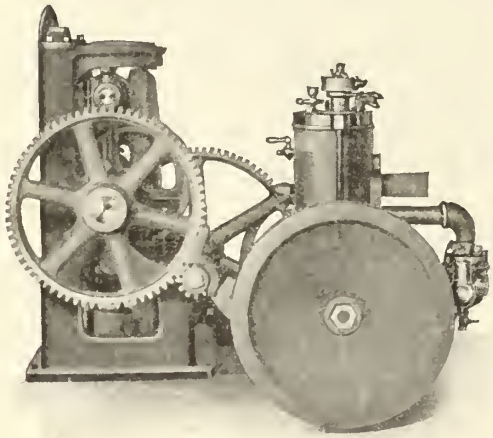

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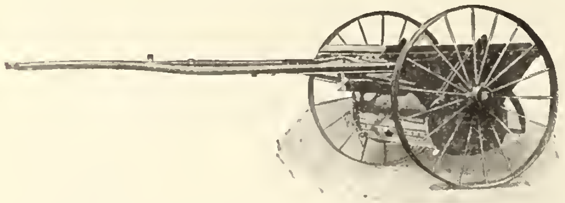

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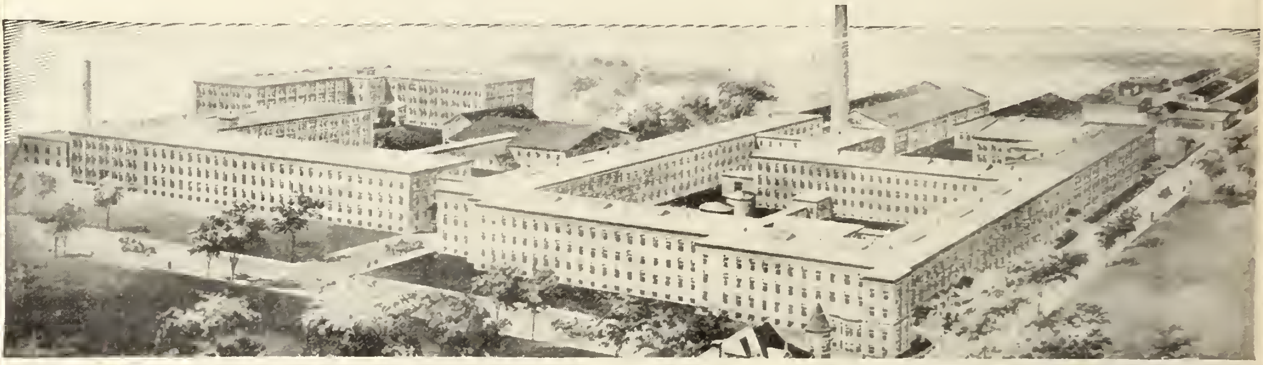
Barrett Specification Roofs



Warner Bros. Co., Corset M'f'rs., Bridgeport, Conn., Day & Zimmerman, Engineers, Philadelphia, Pa.

The Most Economical Roof

FOR half a century architects have known that slag and gravel roofs would *often* show marvelous durability.

The Barrett Specification defines the method by which these roofs may be built so that they will *always* show such durability.

It provides for the best materials manufactured, and prescribes the most approved methods of application.

A Barrett Specification Roof will cost less than any other permanent roof, will last upwards of twenty years and will need no painting or coating or care. Such roofs are fire-retardant and take the base rate of insurance.

That is why they are invariably used on large manufacturing plants where the roof areas are great and where, therefore, the unit costs are carefully studied.

Booklet giving The Barrett Specification in full mailed free on request. Address nearest office.

Special Note

We advise incorporating in plans the full wording of The Barrett Specification, in order to avoid any misunderstanding.

If any abbreviated form is desired however the following is suggested: ROOFING—Shall be a Barrett Specification Roof laid as directed in printed Specification, revised August 15, 1911, using the materials specified, and subject to the inspection requirement.

The Paterson Manufacturing Co., Limited

Montreal Toronto Winnipeg Vancouver, St. John, N.B. Halifax, N.S.

Copper, Iron and Aluminum

WEATHERPROOF • WIRES AND CABLES •
TRADE
WACCO
MARK

With Weatherproof Insulation

Slow Burning Wire

Slow Burning Weatherproof Wire

Bare Copper Wire

Imperial Wire & Cable Company Limited, Montreal

THE NORTHERN ELECTRIC & MANUFACTURING CO., Limited
Sales Agents
TORONTO WINNIPEG REGINA CALGARY VANCOUVER

Doors Sash Frames

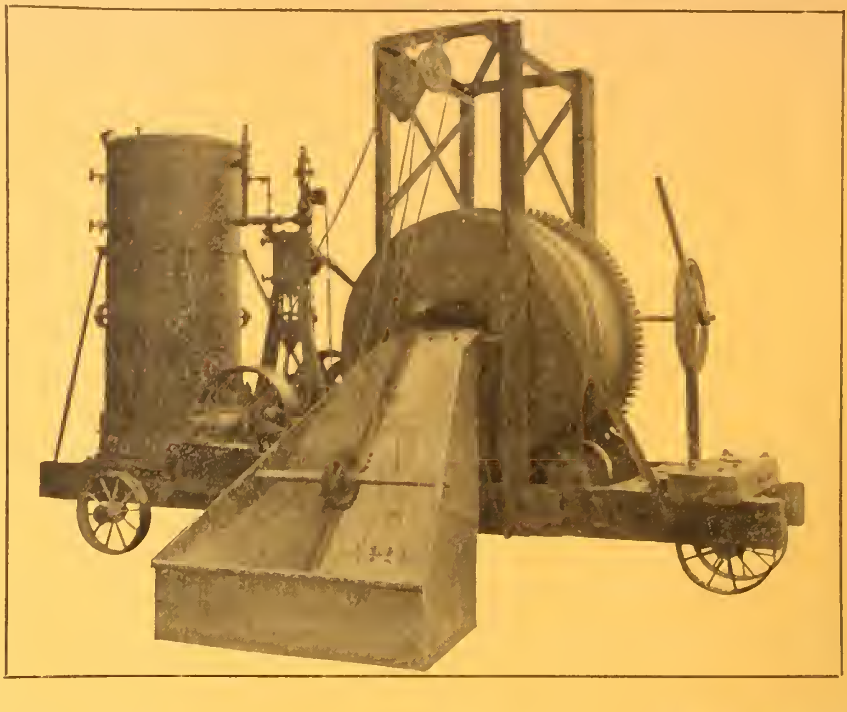
House Trim

Midland Brand

All manufactured in our new and up-to-date factory with latest and best machinery. A knowledge of the requirements of contractors and architects demanding high grade material has enabled us to market interior finish that CAN'T BE BEATEN.

Georgian Bay Shook Mills, Limited

MIDLAND, ONTARIO



WHY should you buy a RANSOME?

When buying a Concrete Mixer

Its not the first cost

But the ultimate cost that counts

You can undoubtedly find many concrete mixers whose first cost is less than the Ransome—but is their ultimate cost less? That's the point.

You cannot afford to buy a machine that is not always reliable, is not satisfactory in operation, is inefficient.

Our Ransome Mixer is the most reliable, efficient and durable mixer on the market. Simple in construction—repair bills are practically nil.

Considering quality and real value in Concrete Mixers—there is no cheaper machine on the market. All sizes in stock.

F. H. Hopkins & Co.

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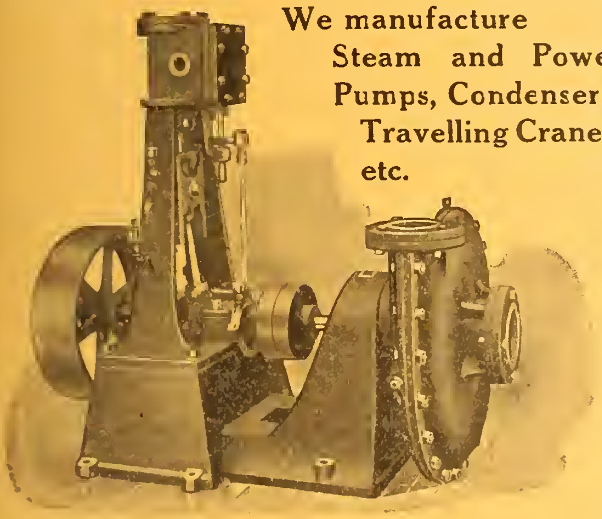

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Bent Glass

Made in all Kinds of Glass on Short Notice

Large Bent Plate Glass for Shop Fronts a Specialty

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That Fit Snugly

Every city and town requiring street openings should see that only the best manholes are used.

We make a specially reinforced manhole cover that fits snugly and is unusually strong.

Our other products include Building post caps, plates and hangers, scruppers and brass castings.

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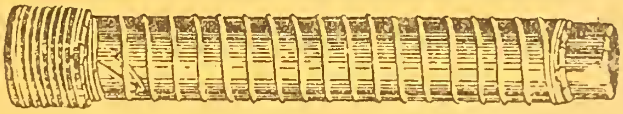

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RESERVOIR TANKS

for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

Pacific Coast Pipe Co., Limited
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Office and Factory, Granville St., near High Bridge
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Full Particulars and Estimates Furnished

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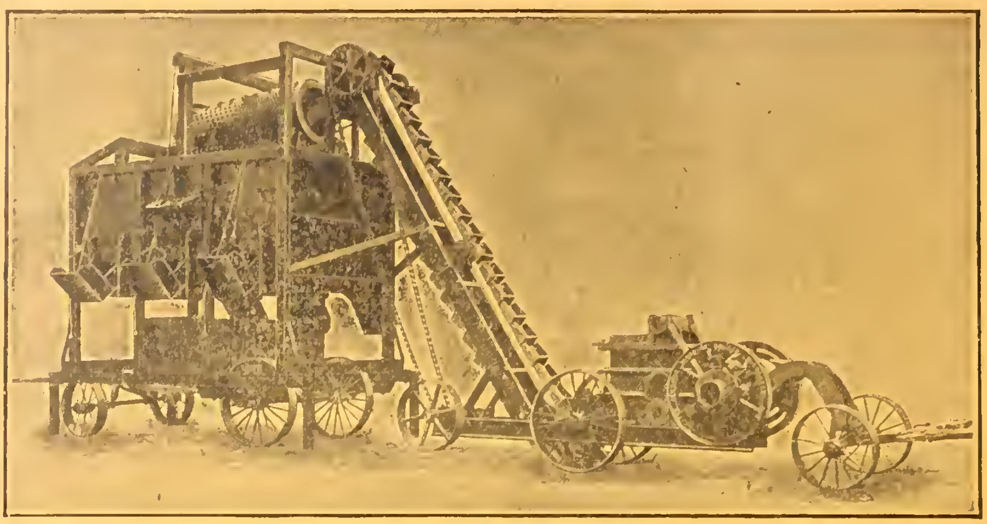

Complete

Crushing Plants

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This cut reproduced from a photograph will give one a good idea of a neat and compact plant.

We have been in the crusher business for years, and our past experience is at your disposal.

Capacity 150 tons in 10 hours.

Size of Crusher 9″ x 16. Will crush to 1½″.

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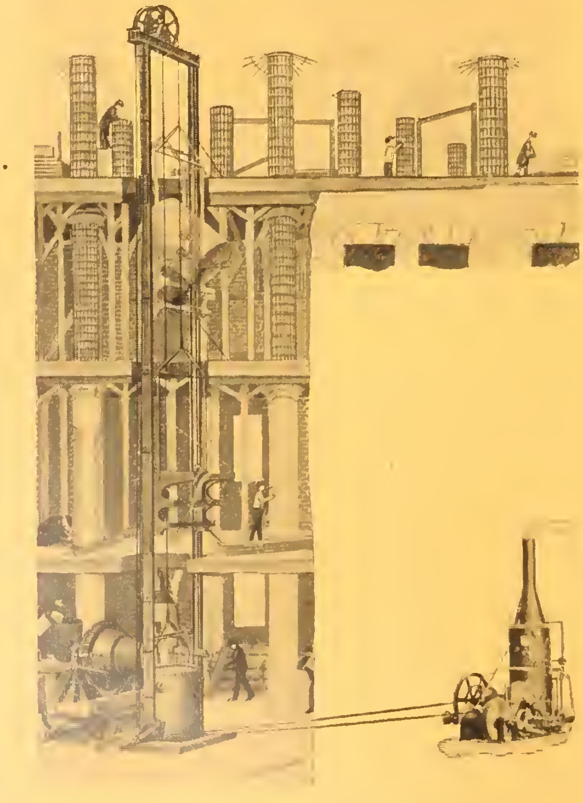

THE "AMERICAN"

AUTOMATIC DUMPING CONCRETE BUCKET ELEVATOR

never fails to land the load where you want it. The automatic switch does the work, without any effort in manipulation.

The Best Thing of its Kind

The only short, quick, strong, safe way to hande concrete, brick, mortar, etc.

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Name

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Please send prices and information on 'AMERICAN' CONCRETE BUCKETS

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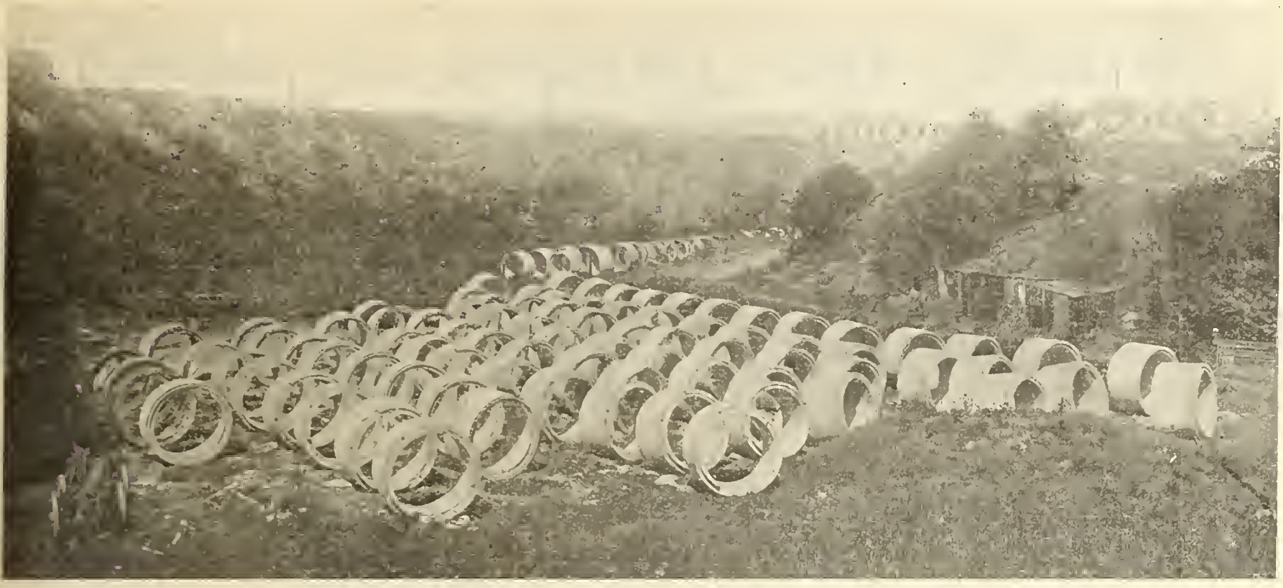


REINFORCED CONCRETE SEWER PIPE. VIEWED FROM C. P. R. TRACK, HAMILTON

If It Passes Our Tests, It Will Meet Your Needs

There is no longer any question about the suitability of concrete for the making of sewer pipes, drains or any work that has to withstand the corrosive effects of acids or the damages inflicted by frost and water.

Reinforced concrete, **properly made,** has been successful in the most rigid tests and is now the recognized material for all important work.

Properly made concrete, means, not only thoroughly mixed and the right proportions of cement, aggregate and sand—it also means that the cement used, be of the highest standard of purity.

The pipes shown here were made in Hamilton, Ont., by the REINFORCED CONCRETE PIPE CO. of JACKSON, MICH. They have made pipes for some of the most important work done, both in the United States and Canada and they now use "Canada" Cement exclusively.

THE REINFORCED CONCRETE PIPE CO., report that although they have, on one piece of work, used cement from no less than five of our mills, they could see no difference in the quality of the cement or in the work produced. That is what the "Canada" Brand stands for:–absolute purity and absolute uniformity.

Canada Cement Co., Limited

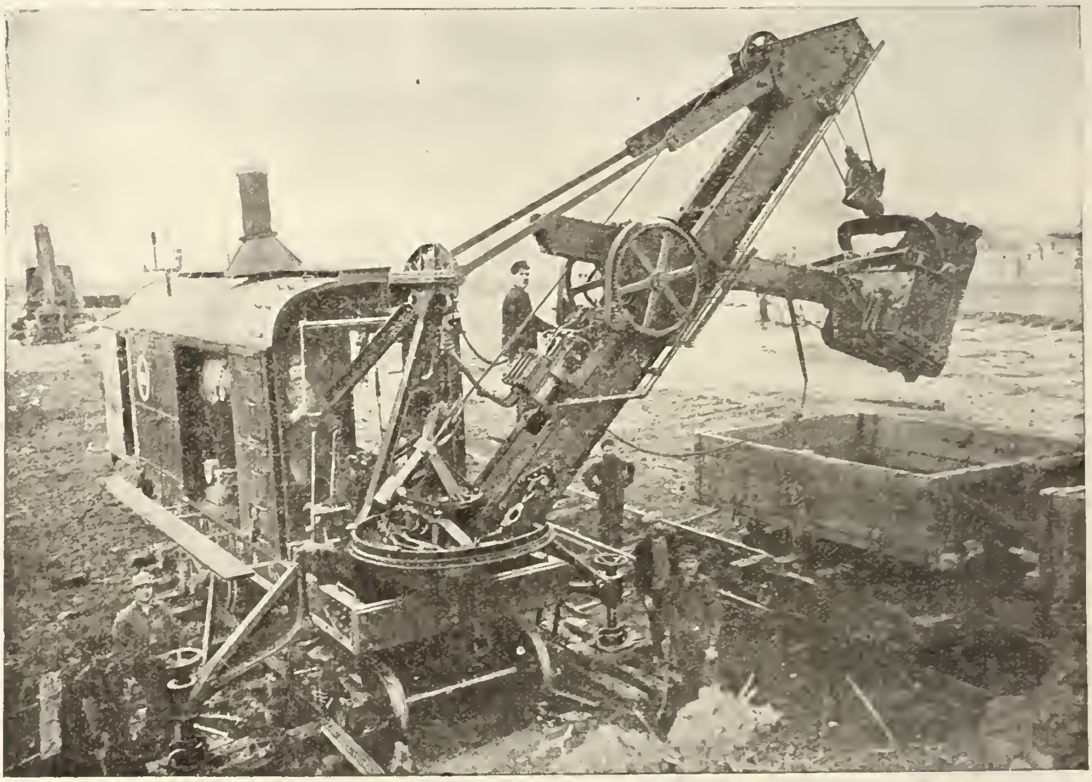
MONTREAL - TORONTO - WINNIPEG - CALGARY

WHERE THE DIGGING IS HARDEST

That is where you need a

BUCYRUS STEAM SHOVE

Made by the BUCYRUS COMPANY, South Milwaukee, Wis.



Bucyrus 40 R—With Rope Hoist

Bucyrus Shovels do the light work and when wanted can get right in and handle the heaviest work.

Latest Models are:	40 c	45 c	60 c	70 c	80 c	95 c	11
	1½ Yard	1¾ Yard	2½ Yard	2½ Yard	4 Yard	5 Yard	6 Y

Montreal, 318 St. James St.
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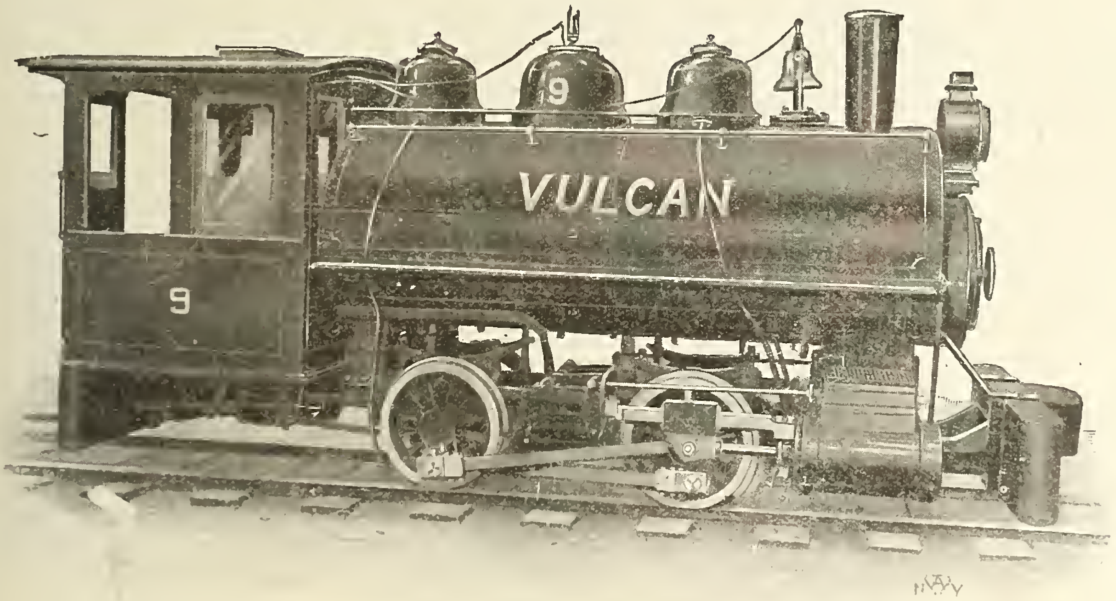
"The Satisfactory Dinkey"

Vulcan Locomotives

MODERN—FULLY EQUIPPED—WELL MADE



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(Continued on page 12)

DON VALLEY BRICKS

Residence of Mr. J. C. Eaton, Toronto. **Messrs. Wickson & Gregg, Architects**

Don Valley Porous Terra Cotta Fire Proofing, Foundation Bricks, Facing Bricks and Enameled Bricks Exclusively Were Used in This Structure

¶ These bricks have been the unanimous choice of discriminating architects and owners in competition with samples submitted by the leading brick firms of Canada and the United States. They are the only thoroughly vitrified facing bricks ever manufactured in the Dominion, and the most exclusive high-class pressed brick on the American continent.

¶ The above view is an illustration of one of the many important buildings in which this product is used.

THE DON VALLEY BRICK WORKS

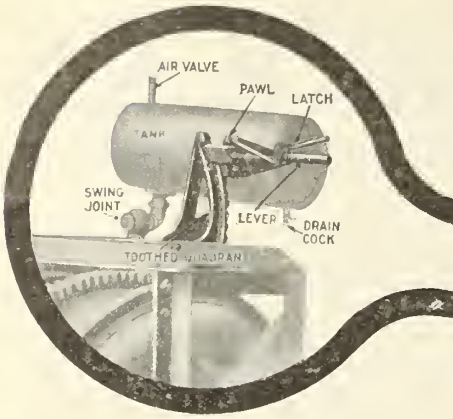
Head Office: 36 Toronto St., TORONTO

Montreal Agent: **David McGill, 83 Bleury Street**

Study the Details

OF THESE CONCRETE MIXERS

They Mean Money Saved for You



This Shows the New M-C AUTOMATIC WATER FEED

The valve lever is operated by the engineer who handles the charging, and as only one movement of the hand is needed to turn the water into the mixer, it does not occupy any of his time or distract his attention in any way from his other duties.

This new feature of the M-C Mixers is the most perfect development of self-regulating water supply yet applied to *any* concrete mixer.

It does just what you tell it to do and is built so it can't go wrong.

**M-C "*Rail-Track*" Mixer
Side Loader Elevated
(Non-tilt)
Also Made in Tilting Form**

DO YOU SEE THE POSITION OF THE DRUM SPROCKET?

Right in the center of the drum,—away from any collection of dirt or spilled concrete and therefore less unable to wear and jam.

On every M-C Mixer the Drum Sprocket is cast in FIVE **INTERCHANGEABLE** SEGMENTS—each one identical with the others. Now *you* know what happens when other drum sprockets break *one tooth*—mixer out of business indefinitely.

IF you have an M-C Mixer all you do is bolt in a *new fifth* piece in a few minutes and KEEP RIGHT ON WORKING.

These Details Make a Big Difference to You!

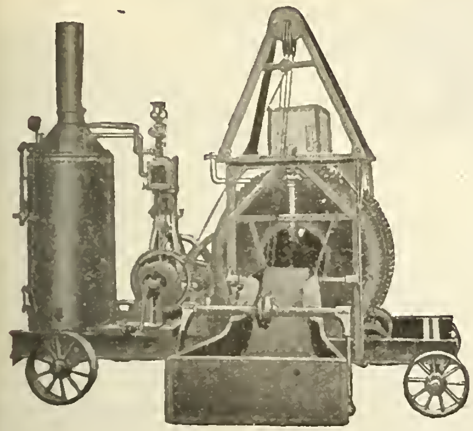
Most Mixing Least Fixing

The
Ford Iron Company
MONTREAL Limited

Everything for Concrete Work Everything for Stone Work

Write any question or phone when in town, Main 7600

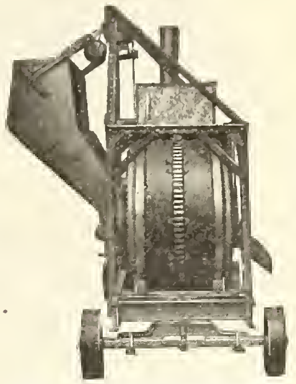
Concrete Mixers



Standard Drum Batch Mixer

SEVERAL KINDS and built in sizes to suit all classes of work.

The Many Improved features of the London Mixers have placed them in a CLASS BY THEMSELVES.



Standard Drum Batch Mixer

WE CAN SAVE THE CONTRACTORS MONEY.

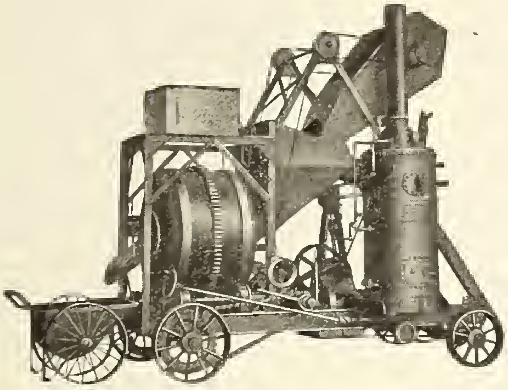
EVERY MACHINE MADE IN OUR OWN FACTORY.

On FIRST COST.

On COST OF MAINTENANCE.

On COST OF OPERATION.

SEND FOR OUR CATALOGUE



Rear Discharge Paving Machine with Forward Loader

Our Machines are not made down to a price, but MADE UP TO A STANDARD.

By Manufacturing IN A LARGE SCALE we have been able to offer High Grade Machines AT REMARKABLY LOW PRICES.

Paving Machine with Side Loader

We manufacture a full line of Concrete Machinery and Cement Working Tools. Also a full line of Hoisting Engines and Contractors Equipment.

We are the Largest Manufacturers of Concrete Machinery in Canada.

No. 2 Automatic Batch Mixer

London Concrete Machinery Co. Limited

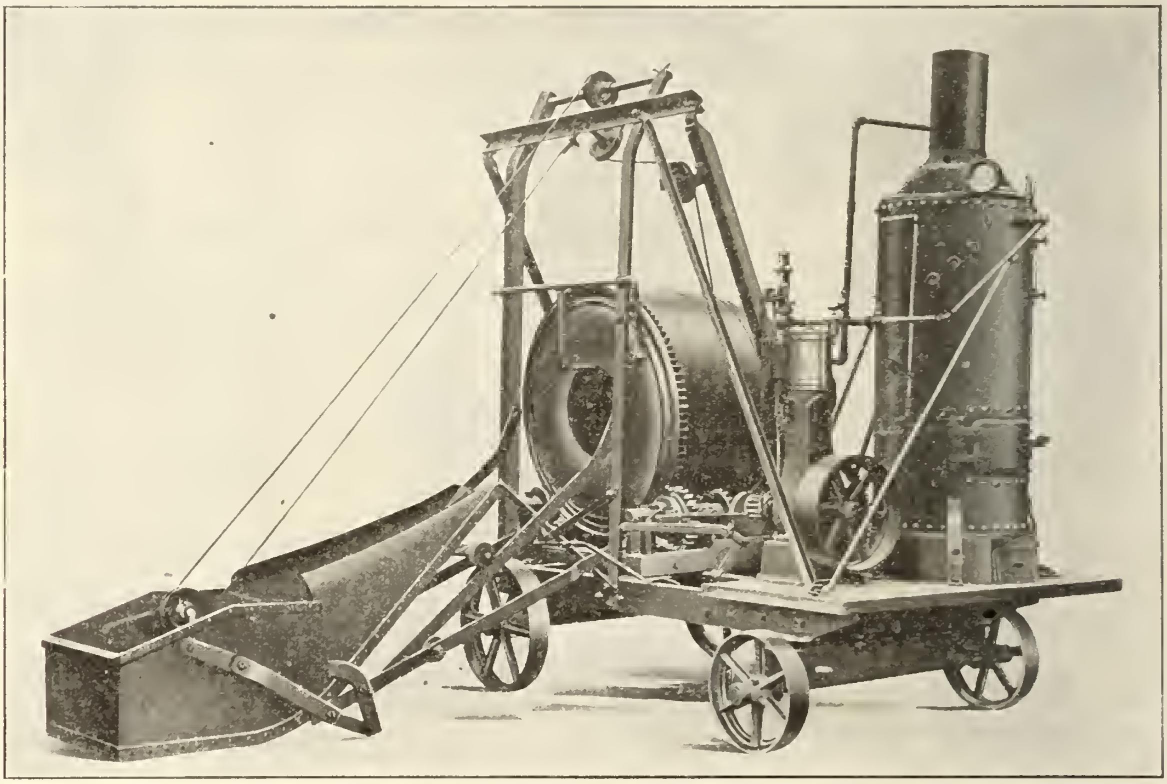
Cabell St. and Kitchener Ave., LONDON, ONT.

AGENTS.—

The Foss & Hill Machinery Co., 329 St. James St., Montreal, Que.

G. B. Oland, 28 Bedford Row, Halifax, N. S.

Not Cheaper—But Better "Wettlaufer" Improved Heartshape Mixer.



There are a number of different methods of mixing concrete—every contractor knows that.

But it is a fact that **the** one way—the best—is dependent on two conditions—**correct consistency,** and **proper mixing.**

Correct consistency is entirely in the hands of each individual contractor.

But the mixing—that's up to us.

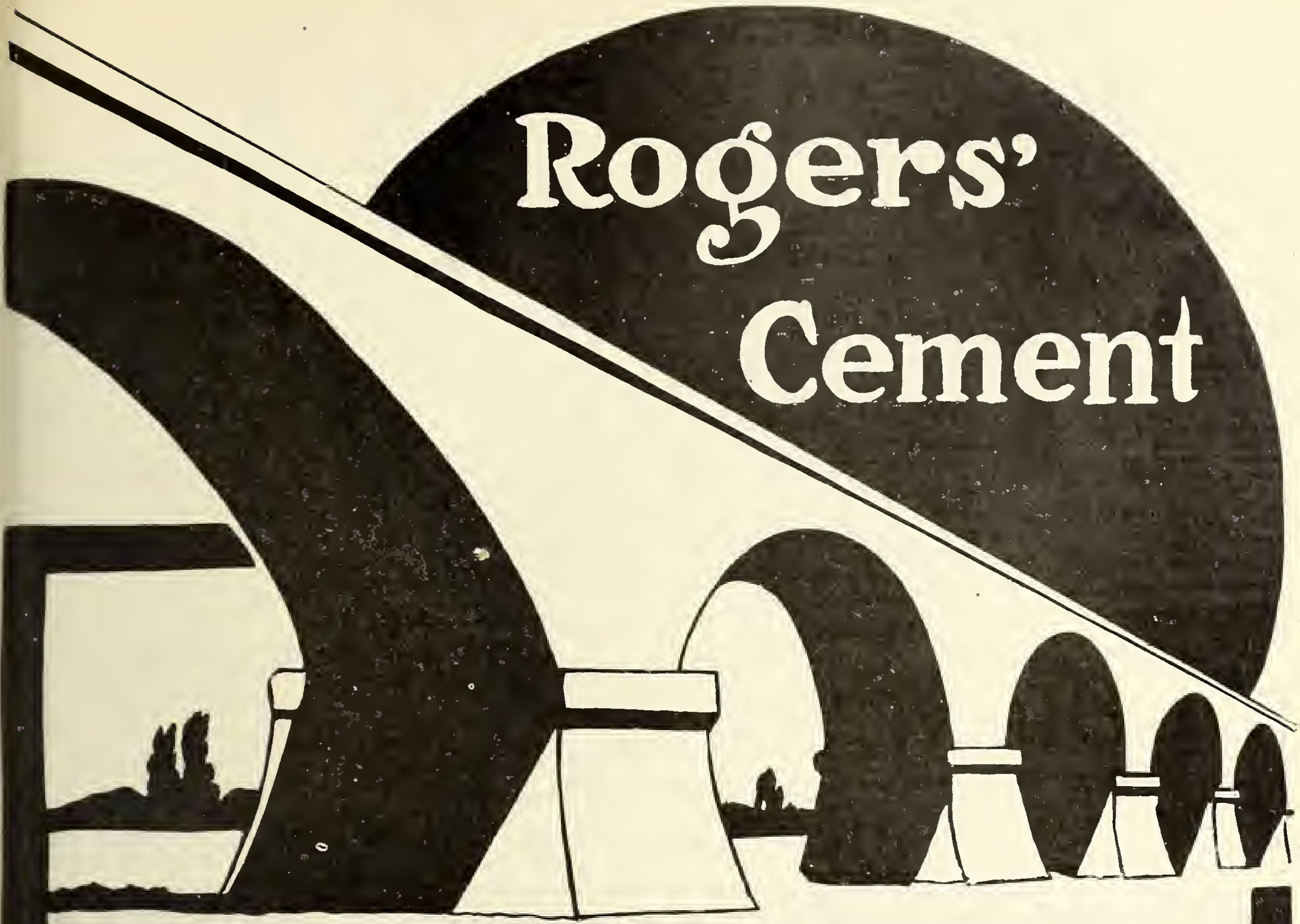
We can prove to you that the Wettlaufer Heartshape Mixer does the best possible work—does proper mixing.

Wettlaufer Heartshape Mixers will produce perfect concrete—capacity unlimited.

Catalogue and prices on request.

Wettlaufer Bros.

178 Spadina Ave. Toronto, Ont.



ROGERS Brands of Portland Cement are carefully *standardized* for *high strength, uniformity and evenness* of action, and *good binding power* in concretes made with a *large bulk* of aggregates. This last feature is one of the crucial tests of Portland Cement quality.

Engineers and Architects who specify Rogers Brand Portland Cements have *every protection* afforded their work as to *stability* and *successful* construction, while the erecting contractor has available stock at *near-by* freight points, *reserve* stock for *prompt* shipments, and Portland Cements that offer every facility of *easy and rapid construction* with concretes of strengths that are *over usual standards* for their proportion of aggregates.

The *Service* features of the Rogers organization are an asset in making the use of Rogers Brand Portland Cement both *economical* and *profitable* in both *small* and *large construction.*

Our Mills are located at Atwood, Durham, Hanover,
Kirkfield, Orangeville, Owen Sound and Wiarton.

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4

CLASSIFIED INDEX TO ADVERTISEMENTS—Continued

Pumps and Pumping Machinery
(Continued from page 6)
Escher Wyss & Co.
Hopkins & Co., F. H.
Inglis Co., John
McDougall Caledonian Iron Wks
Mussens Limited
Ontario Wind Eng. & Pump Co.
Smart-Turner Machine Co.
Waterous Engine Works Co.

Quarry Machinery
Canadian Rand Co.
Improved Equipment Co.
Johnston & Chapman
George Anderson & Co.

Railway Supplies
Ford Iron Co.
Gartshore, John J.
Hopkins & Co., F. H.
Mussens Limited

Reinforcements, Concrete & Steel
Ambursen Hydraulic Cons. Co.
Canada Wire & Iron Goods Co.
Factory Products
Ford Iron Co.
Greening Wire Co., B.
Leach Contracting Co.
Page Wire Fence Co.
Steel Co. of Canada
Steel & Radiation
Trussed Concrete Steel Co.
Turner, C. A. P.

Revolving Stone Screens
Greening Wire Co., B.
Johnson & Chapman Company

Road Machinery
Erie Machine Co.
Ford Iron Co.
Hamilton Machinery Co.
Morrison & Co., T. A.
Mussens Limited
Western Wheeled Scraper Co.
Waterous Engine Works Co.

Roofing Materials
Canadian Supply Company
Galt Art Metal Co.
Metallic Roofing Co.
Metal Shingle & Siding Co.
Noble, Clarence W.
Paterson Mfg. Co.
Standard Paint Co.

Rubber Belting
Goodyear Tire & Rubber Co.

Safes and Vaults
Taylor, J. & J.

Sand Spreader
Aut. Sidewalk Sand Sp'd'r. Co.

Sand and Gravel
Rogers Supply Co.
Sand & Supplies
Smyth & Ryan
York Sand and Gravel Co.

Screens
Greening Wire Mfg. Co., B.
Johnson & Chapman Company

Sewer Pipe
Britnell & Co.
Canada Iron Corporation
Dominion Sewer Pipe Co.
Ford Iron Co.
Gartshore Thomson Pipe Co.
National Iron Works
Ontario Sewer Pipe Co.
Ontario Lime Association
Standard Drain Pipe Co.

Shovels (Steam)
Browning Engineering Co.
Beatty & Sons, M.
Canada Foundry Co.
Ford Iron Co.
Hopkins & Co., F. H.
Montreal Locomotive Works
Mussens Limited
Willis Shaw Mach. Co.

Smoke Stacks
Des Moines Bridge Co.

Steam Apparatus
Sturtevant Co., B. F.

Steel Bars
Factory Products
Steel Co. of Canada

Steel Shingles and Ceilings
Galt Art Metal Co.

Stone
Britnell & Co.
Brodie, Jas.
Christie, Henderson & Co.
Consolidated Stone Co.
Contractors' Supply Co.
Corinthian Stone Co.
Crushed Stone, Limited
Doolittle & Wilcox
Hagersville Contracting Co.
Laurentian Granite Co.
McMillan & Son, R.
Morrison & Co., T. A.
Myers, Oakley
Queenstown Quarry Co.
Rogers Supply Co.
Roman Stone Co.
Sackville Freestone Co.
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Anderson, Geo.

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Steel Co. of Canada
Phoenix Bridge & Iron Works
Reid & Brown
Sarnia Bridge Co.
Steel & Radiation

Submarine Diver
Rouleau, Joseph N.

Submarine Drills
Canadian Rand Co.

Tanks and Stand Pipes
Berg Machinery Co.
Des Moines Bridge Co
Inglis, John
Jenckes Machine Co.
Marsh & Henthorn
McDougall Caledonian Iron Wks
Ontario Wind Eng. & Pump Co.
Piggott & Co., Thos.

Technical Journals
Ainsworth & Sons, Wm.

Tents
Turner & Sons, J. J.
Woods Limited

Testing and Inspection Bureau
Hunt & Co., Robt. W.

Valves
Canada Iron Corporation
Gartshore-Thomson Pipe Co.
Kerr Engine Co.

Ventilating & Heating Apparatus
Sturtevant Co., B. F.

Veterinary Remedies
Johnson, A. H.

Water Softeners and Filters
American Water Softener
Berg Machinery Co.

Water Turbines
Canadian Boving Co.
Escher Wyss & Co.

Water Wheels
Canadian Boving Co.
McDougall Caledonian Iron Wks

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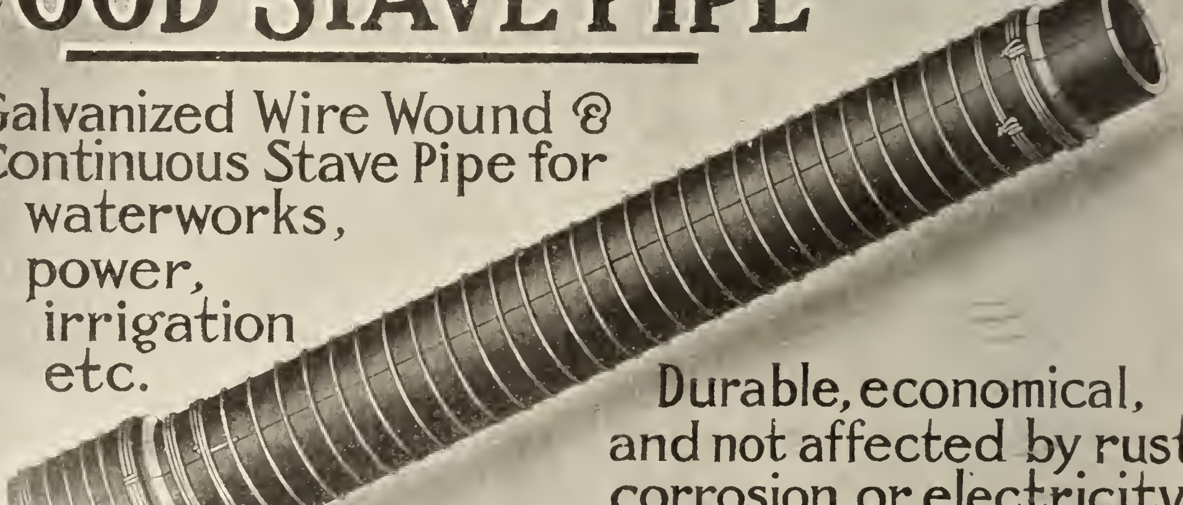

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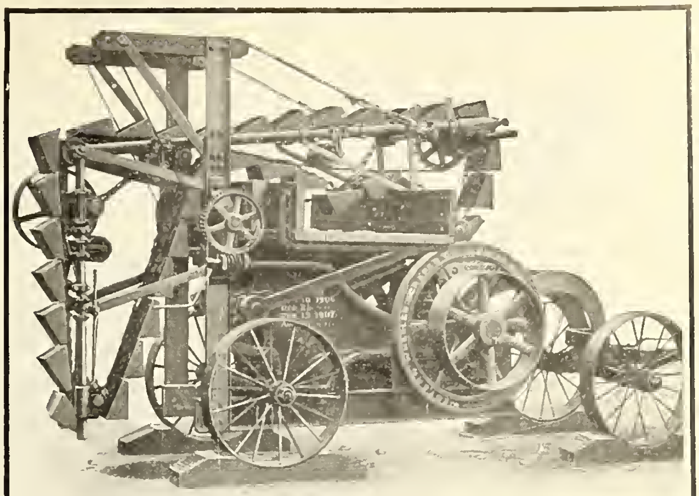

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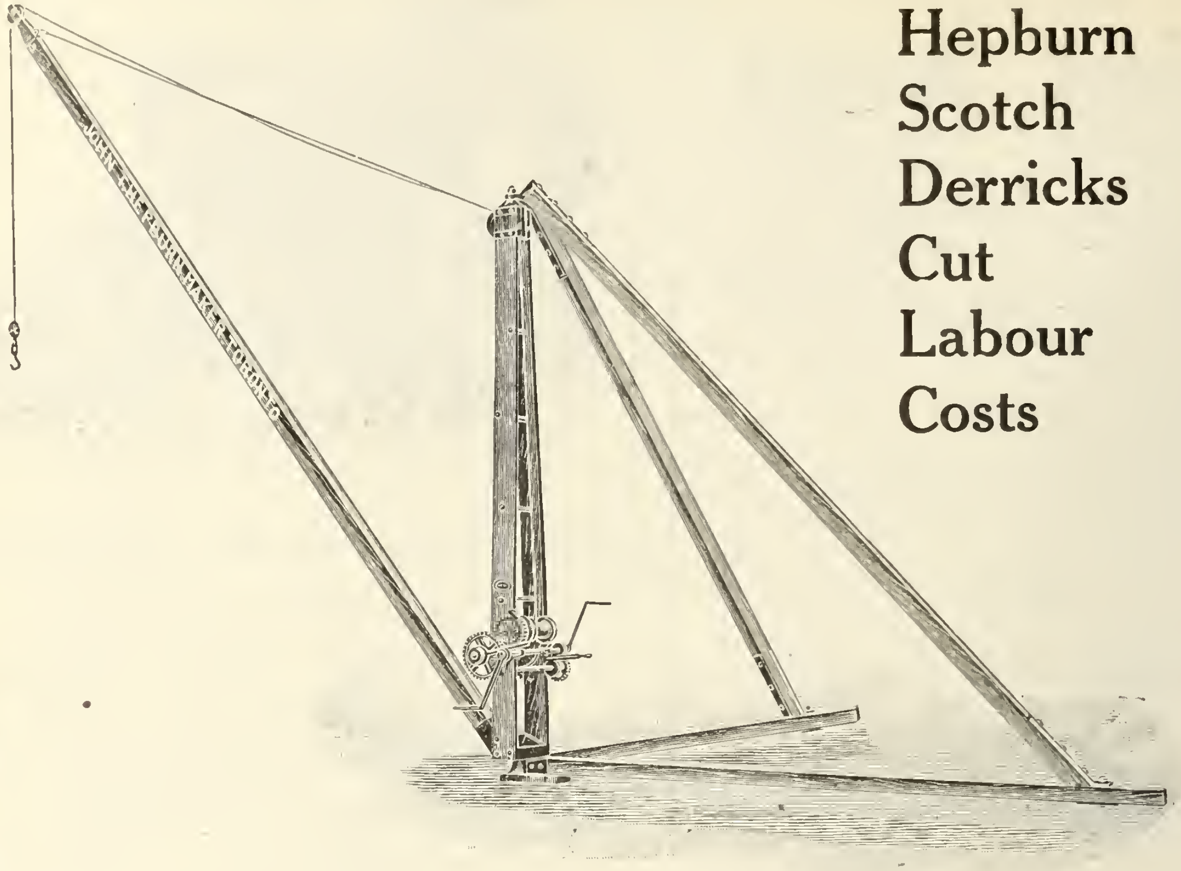
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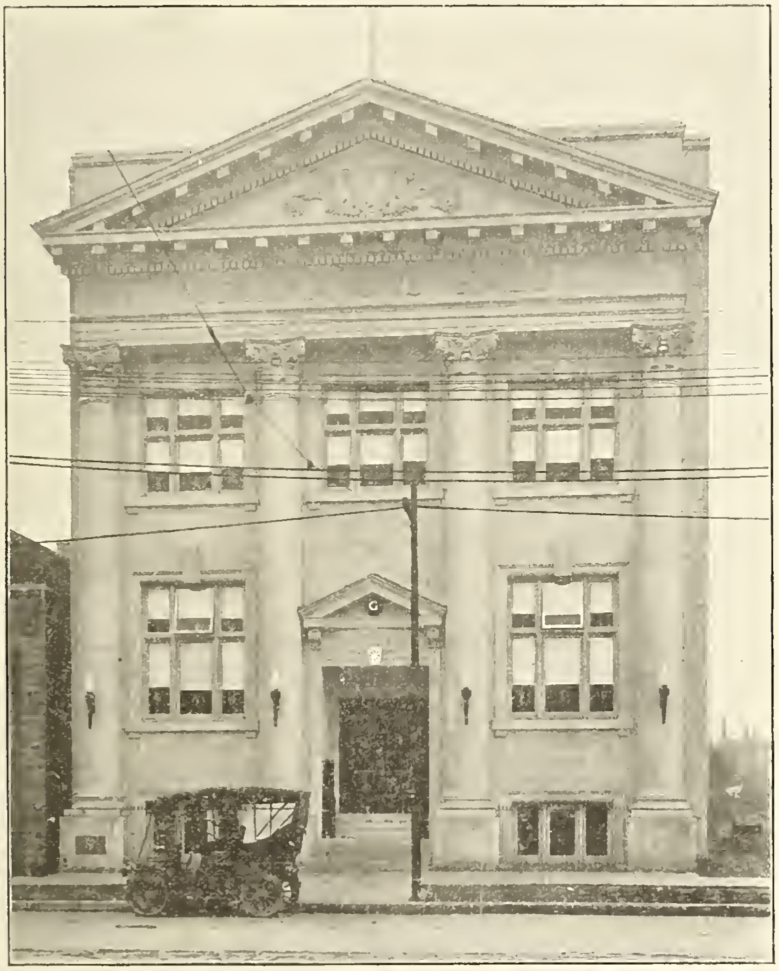

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ALPHABETICAL LIST OF ADVERTISERS

Abenaque Machine Works 80
Acme Equipment & Engineering Co. 99
Ainsworth & Sons, Wm. 25
Albert Manufacturing Co. ....
Alsen's American Portland Cement Wks. .. 78
Ambursen Hydraulic Construction Co. of Canada, Limited 76
American Enameled Brick & Tile Co. 82
American Hoist & Derrick Co. 2
American Water Softener Co. 94
American Spiral Pipe Works 79
American Well Works 101
Anderson & Co., 1905 Ltd. George 22
Andresen, H. P. 34
Asbestos Mfg. Co. 99
Automatic Wood Box & Turning Co. 82

Bain & Ross 92
Bates & Edmonds Motor Co. 94
Batts Limited 103
Beatty & Sons Limited, M. 79
Beckman Company, L. 85
Bell Filtration Co. of Canada, Ltd. 102
Bennett, Robert ....
Berg Manufacturing Company ....
Blystone Manufacturing Company 99
Bowman & Connor 92
Bremner Limited, Alex. 91
Britnell & Co., Ltd. 86
Brodie & Company, James ....
Brown Hoisting Machinery Co. 83
Browning Engineering Company ....
Buffalo Meter Co. 27
Business Systems Limited 75
Bryan Manufacturing Compaoy ....

Canada Cement Co., Ltd. 3
Canada Foundry Co., Ltd. 20-69-97
Canada Iron Corporation Limited 91
Canada Steel Company 31
Canada Wire & Cable Co. 94
Canada Wire & Iron Goods Co. 79
Canadian Boving Company 30
Canadian Bridge Co., Ltd. 88
Canadian Fairbanks-Morse Co., Ltd. 22
Canadian Kellogg Company 35
Canadian Office and School Furniture Company, Limited ....
Canadian Norcross Bros. Co. 18
Canadian Pipe Co., Ltd. 90
Canadian Rand Co., Ltd. 95
Canadian Supply Company 93
Cement Era Publishing Company 13
Ceresit Waterproofing Company ....
Chipman & Power 92
Christie Henderson & Company 79
Cleveland Bridge & Engineering Co., Ltd. . 88
Cleveland & Erie Mach. Co. 87
Cloisonne Glass Co. of Canada 105
Colonial Glass Co. 105
Cook, A. D. 94
Commercial, The 87
Conduits Company, Limited 91
Consolidated Glass Company ....
Consumers' Gas Company 76
Consolidated Optical Co., Ltd. 81
Consolidated Stone Co. 86
Contractors' Supply Co., Ltd. 86
Crushed Stone Limited 75
Corinthian Stone Co. 24

Dahlstrom Metallic Door Co. 96
Dennis Wire & Iron Works Co., Ltd. 90
Des Moines Bridge & Iron Co. 79
Dickson Bridge Works Co., Ltd. 105
Doolittle & Wilcox Limited 91
Dominion Bridge Co., Limited 88
Dominion Creosoting Company 73
Dominion Marble Co., Ltd. 21
Dominion Sewer Pipe Co., Ltd. 21
Dominion Wood Pipe Co., Limited 12
Don Valley Brick Works 7
Down Draft Furnace Company 105

Eadie-Douglas Limited ....
East Iron & Machine Co. 78
Eastern Pipe & Construction Co., Ltd. 80
Eaton & Co., T. 85
Erie Machine Shops 74

Factory Products Limited 35
Farmer, John T. 92
Ferguson, H. S. 92
Ford Iron Company, Limited 8
Foundation Company ....
Fuce, Edward O. 92

Galt Art Metal Co., Limited 104
Galt Engineering Co., John 92
Garlock Packing Co. ....
Gartshore, John J. 92
Gartshore-Thompson Pipe & Foundry Co., Ltd. 90
General Machinery Co., Ltd. ....
Georgian Bay Shook Mills, Ltd. ....
Gibb, Alexander 85
Goodyear Tire & Rubber Co. of Canada, Ltd. 33
Greening Wire Co., Ltd., B. 96
Guarantee Company of North America 92
Gurley, W. & L. E. 84

Hagersville Contracting Co., Ltd. 13
Hamilton Pressed Brick Co. ....
Hamilton Machinery Co., Ltd. 26
Hancock, Jr., H. Syd. 92
Harvey, J. 87
H. & E. Lifting Jack Co. ....
Heinicke Inc., H. R. ....
Hepburn, John T. 14
Hobbs Manufacturing Co., Ltd. 34
Holmes & Sons, Fred ....
Hopkins & Company, F. H. 108
Hunt & Company, Robert W. 92
Hunter Bridge & Boiler Co., Ltd. 89

Imperial Wire & Cable Co., Ltd. 107
Improved Equipment Company 23
Inglis Company, John 67
International Marine Signal Co., Ltd. 29

Jamieson Lime Company ....
Jenckes Machine Company, Ltd. 2
Johnston, A. H. 74
Johnston & Chapman Company ....

Kennedy, James C. 92
Kerr Engine Co., Ltd. 98
Koehring Machine Co. 32

Laurentian Granite Co., Ltd. 92
Lea, R. S. 92
Leach Concrete Company ....
Leonard & Sons, E. 75
London Concrete Machinery Co., Ltd. 9
London Gas Power Co., Ltd. 71
Luxfer Prism Company 96

Mace, T. Harry 92
MacKinnon Holmes & Co., Ltd. ....
MacLean Daily Reports 34
Marsh & Henthorn Limited 71
McCoy Company, Henry J. 25
McDougall Caledonian Iron Wks. Co., John 69
McIlwraith, James A. 92
McMillan & Sons, W. N. ....
McNally & Co., William 89
Meadows, George B. 35
Metal Shingle & Siding Co. ....
Metallic Roofing Co., Ltd. 71
Metropolitan Paving Bricks Co. 31
Miller & Co., George M. ....
Mitchell, Chas. H. & Percival H. 92
Mitchell Company, Ltd., Robert 88
Mississquoi Marble Co., Ltd. 82
Montreal Locomotive Works, Ltd. 75
Morrison & Co., T. A. 92
Munderloh & Co., Ltd. 13
Mussens Limited 4
Myers, Oakley 75

National Bridge Co., of Canada, Ltd. 89
National Iron Works Ltd. 91
Neptune Meter Co. 27
Noble, Clarence W. 78
Northwestern Terra Cotta Company 83

Ontario Asphalt Block Co., Limited 78
Ontario Lime Association Limited 77
Ontario Sewer Pipe Co., Ltd. 20
Ontario Wind Engine & Pump Co., Ltd. .. 75
Ormsby, Limited, A. E. 17
Owen Bucket Co. 80

Pacific Coast Pipe Co., Ltd. 1
Page Wire Fence Co., Ltd. 83
Paterson Manufacturing Co. ....
Pedlar People Limited 106
Phoenix Bridge & Iron Works, Limited... 89
Piggott & Company, Thos. 72
Port Credit Brick Co., Ltd. 90
Power & Son ....
"Prime White" Road Oil Co. 100
Pyle-National Electric Headlight Co. 19

Queenstown Quarry Co., Ltd. 91

Reid & Brown 92
Rhodes Curry Company, Limited 71
"R. I. W." Damp Resisting Paint Co. ... 19
Rogers Limited, Alfred 11
Rogers Supply Company 25
Roman Stone Co., Limited 15
Rouleau, Jos. N. 92

Sackville Freestone Co., Ltd. 29
Sand & Supplies, Ltd 89
Sarnia Bridge Co., Ltd. 89
Sheppard & Sons, Jas. 85
Slack, T. ....
Smart-Turner Machine Co., Ltd. 1
Smith, Limited, Thomas & Wm. 72
Smyth & Ryan 86
Standard Drain Pipe Co., Ltd. 21
Standard Foundry & Machine Co. 1
Standard Ideal Co., Ltd. 36
Standard Scale & Supply Co. ....
Steel Company of Canada 30
Steel & Radiation, Limited 28
Steward, A. P. 74
Stinson-Reeb Builders' Supply Co. 36
Sturtevant, B. F. 74

Taylor, J. & J. 34
Taylor, Hogle & Davis ....
Tide Water Iron Works 77
Thew Automatic Shovel Co., The 31
Thompson & Co., B. & S. H. 21
Toronto Furnace & Crematory Co. ....
Toronto Plate Glass Importing Co., Ltd.. 1-83
Troy Wagon Works Co. 82
Trussed Concrete Steel Co. 100
Turner, C. A. P. ....
Turner & Sons, J. J. 104

Union Water Meter Co. 27
Universal Crusher Co. 80

Vulcan Iron Works 82

Wadsworth Howland & Co., Inc. 79
Waterous Engine Works Co., Ltd. 77
Watson Wagon Company ....
Watts & Son, E. R. 32
Weeks, Arthur L. 92
Wells & Gray, Ltd. ....
Western Canada Contractor 86
Western Wheeled Scraper Co. 13
Wettlaufer Bros. 10
Whitehead & Co., Ltd., John 107
Wilson Bros., Ltd. 84
Woods Limited 27
Wyss & Co., Escher ....

York Sand & Gravel Co. 86

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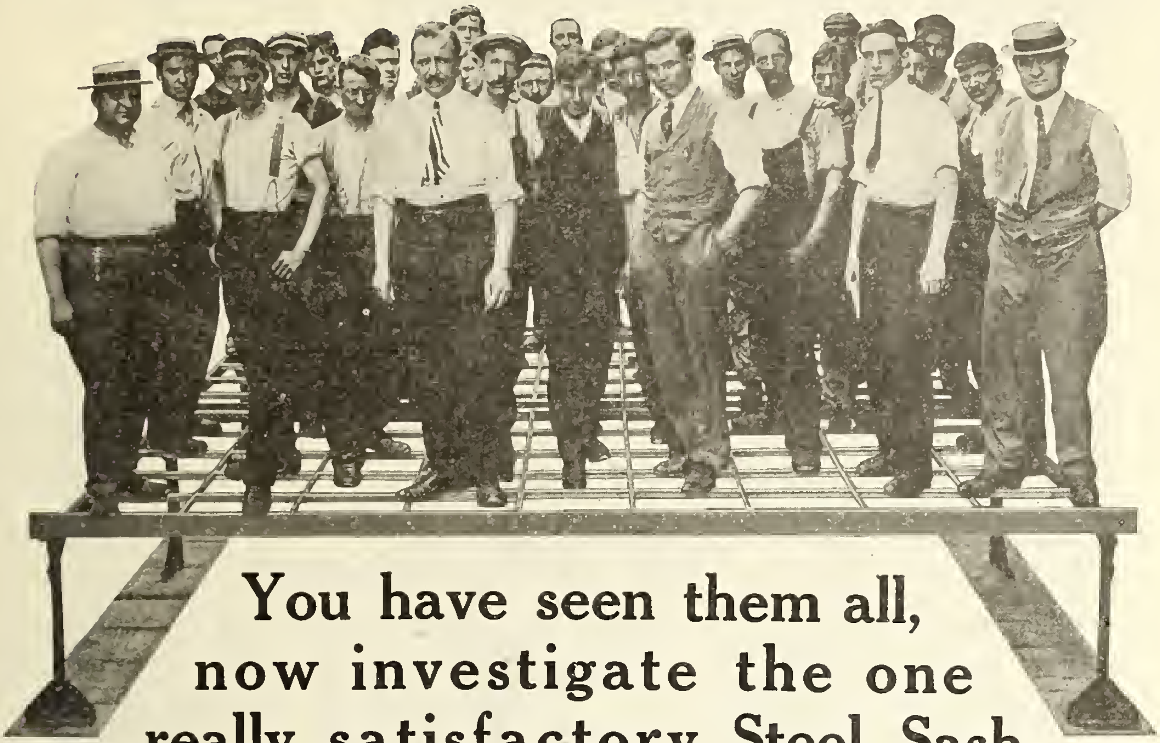

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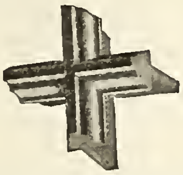

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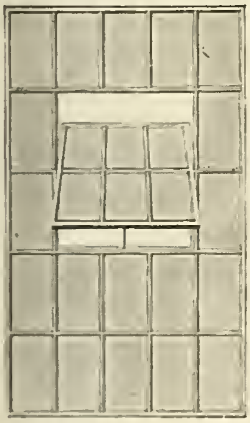

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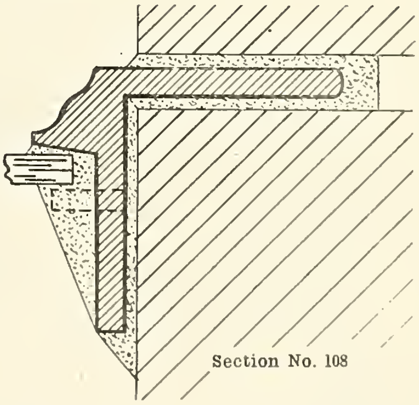

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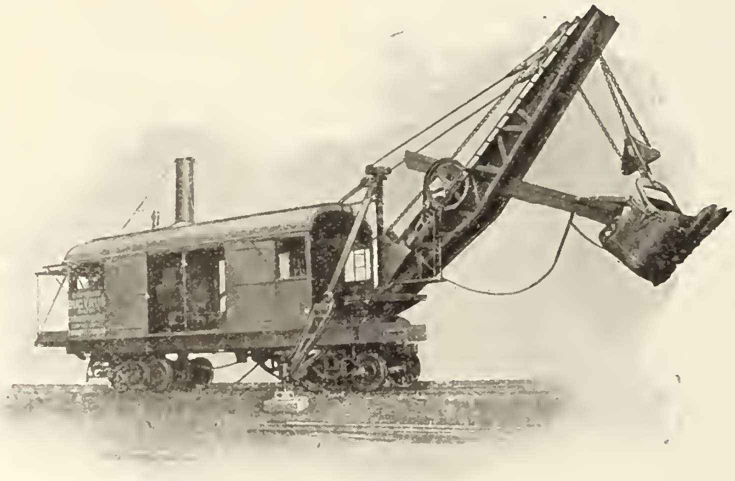

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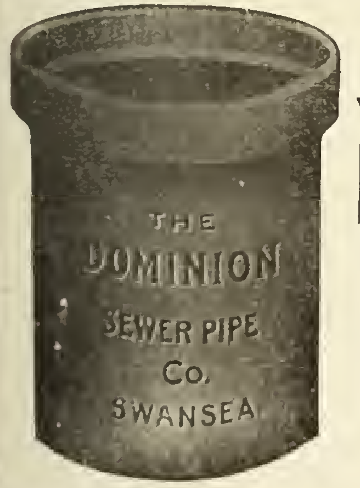

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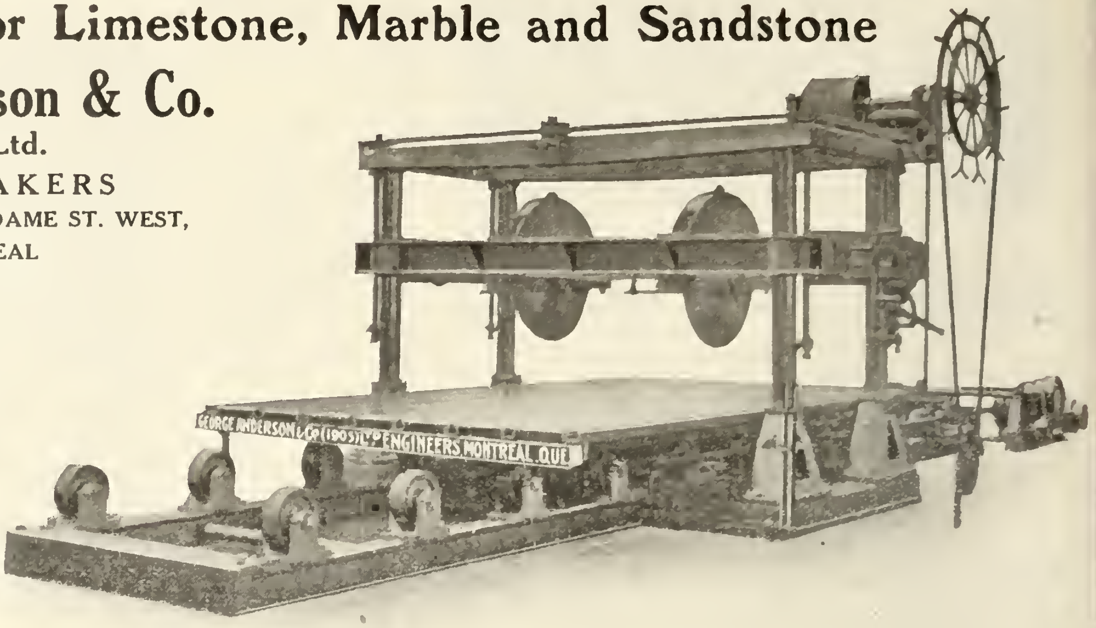

Anderson's Rising and Falling Diamond Saw, made under British and U.S.A. Patents 209179, 657262 SINGLE AND DOUBLE TABLES
About 50 of the above Machines at work in Canada

If You're Building

a Skyscraper, a Cottage, or a Railroad

You will need supplies of some description, whether large machinery or merely a pick and shovel. Whatever it is you should consult us immediately, as we have a most complete line of contractors' supplies. We specialize on FAIRBANKS-MORSE GASOLINE ENGINES and apply them to every power-driven apparatus a contractor uses. Let us show you in our catalogue some of the ways we have applied Fairbanks-Morse engines to reduce labor cost in your line of work.

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More Lime and Better Lime at Less Cost

Can Be Made With

DOHERTY LIME KILNS

The problem of economical lime manufacture is a problem of combustion economy—of utilizing in fullest degree the heat value of the fuel used in lime burning.

Our years of experience as combustion engineers have been applied to this problem and the result is our line of lime kilns now offered to the lime burning industry.

We call the attention of up-to-date lime manufacturers to the following high-duty lime making equipment:—

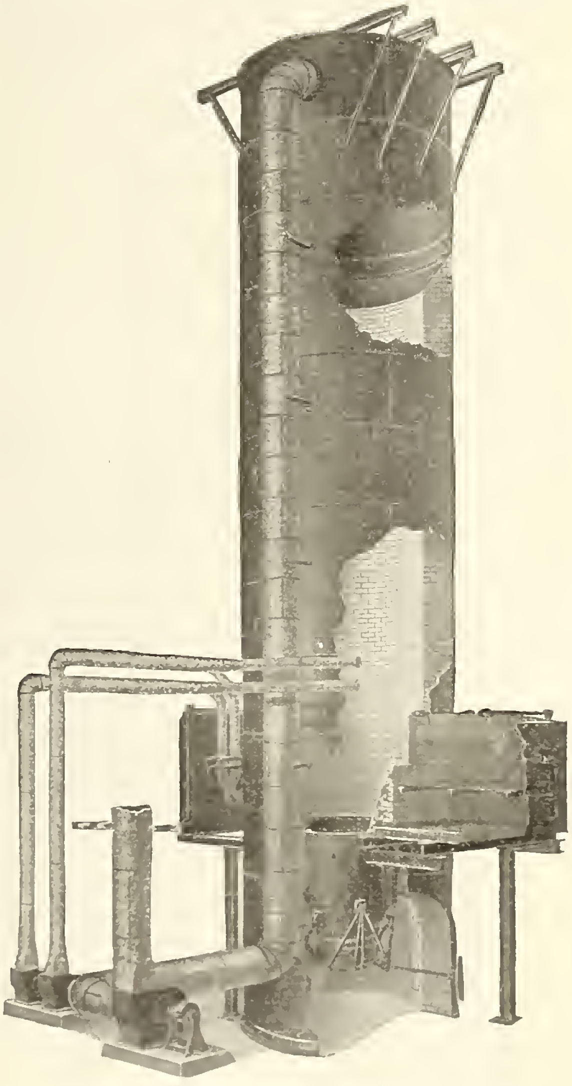
The Doherty Coal Fired Kiln
The Doherty Producer Fired Kiln
The Doherty Gas Fired Kiln
The Doherty Oil Fired Kiln
The Doherty Wood Fired Kiln

This is a line of kilns unequaled in diversity, durability, economy and capacity. They represent the most advanced ideas, the best materials and construction, and a thorough understanding of the conditions involved in lime production.

In the design of these kilns, our object has been to produce more lime and better lime at less cost than any other kilns on the market, and to maintain this performance with the minimum of up-keep charge.

Our facilities, moreover, are not limited to kiln manufacture. We are prepared also to install complete lime plants, from the quarry machinery to the hydration equipment, if necessary.

We are the only builders offering this complete service, with the benefits of a centrallized responsibility covering the entire equipment.



Standard Doherty Coal Fired Lime Kiln

And to our customers we afford as well our advisory service as combustion and mechanical engineers—the fruit of our long experience.

Write us for our Bulletin No. 4, on "Lime Kilns and Lime Burning Equipment," which will be sent on request

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is the best Manufactured Stone, equal to Natural Stone in strength and appearance; but the Cost is much Less.

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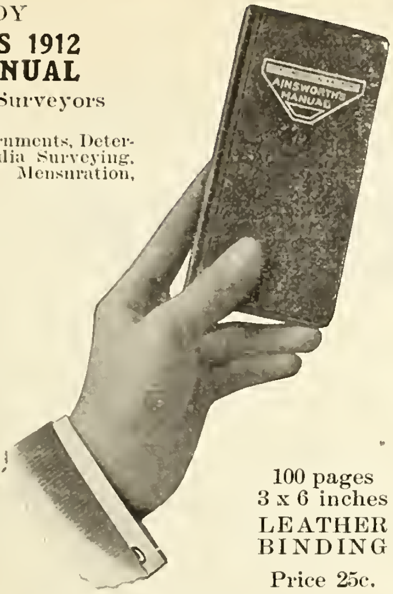

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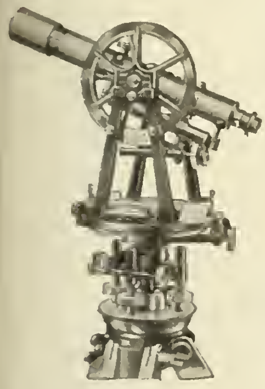

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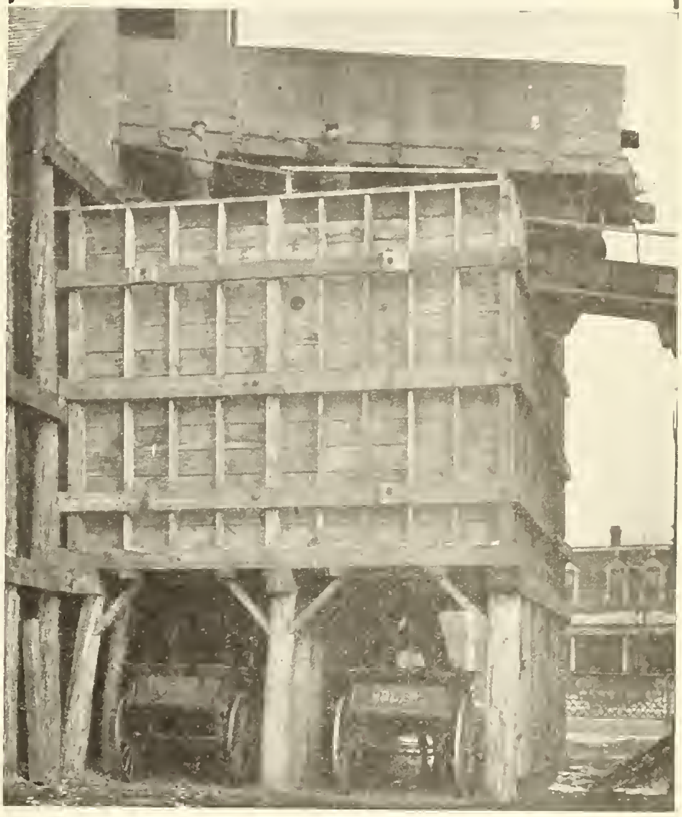
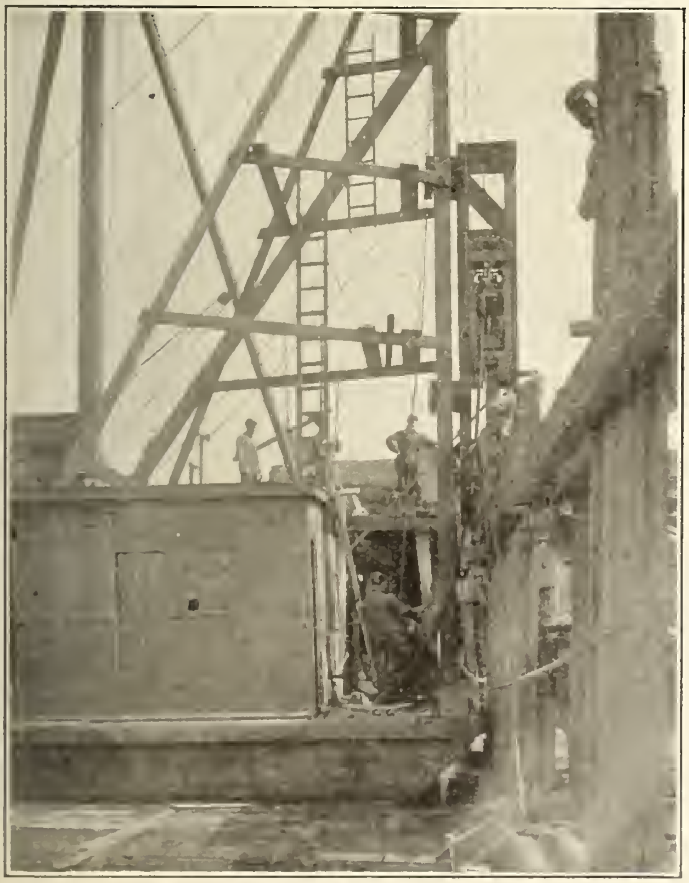
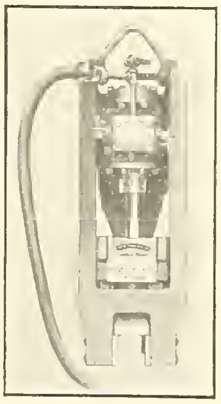




No. 3 DRIVING 8″ x 3″ Tongued and Grooved Sheeting

New Monarch Steam or Air Pile Hammer



It is the quickest acting Hammer on the market and strikes the heaviest blow.

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Is not the money called for in an investment like this *too much* to warrant any but the most careful investigation.

Investigation! That is all we ask of you for the

"CHAMPION" Rock Crushers

This is what investigation will prove to you:

That the great exclusive Champion feature "two motions of the jaws instead of one" accomplishes the same quantity of work with *half the speed* of other crushers. Everyone knows that it is speed that kills a crusher—brings repairs and brings the end.

Write us for the catalog. It shows the interesting working principle of this powerful crusher and explains its quality. It also shows the full line of Champion Road Machinery.

"Standard in Canada for Twenty Years"

Manufactured by

American Road Machinery Company, of Canada, Limited
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Sole Canadian Distributors
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In Water Meters

Means Just This:

Accuracy, uninterrupted service, without frequent and expensive repairs and the application of the right principles of construction and operation to specific needs.

Let us tell you something of the efficiency of our Water Meters and the various types which we manufacture

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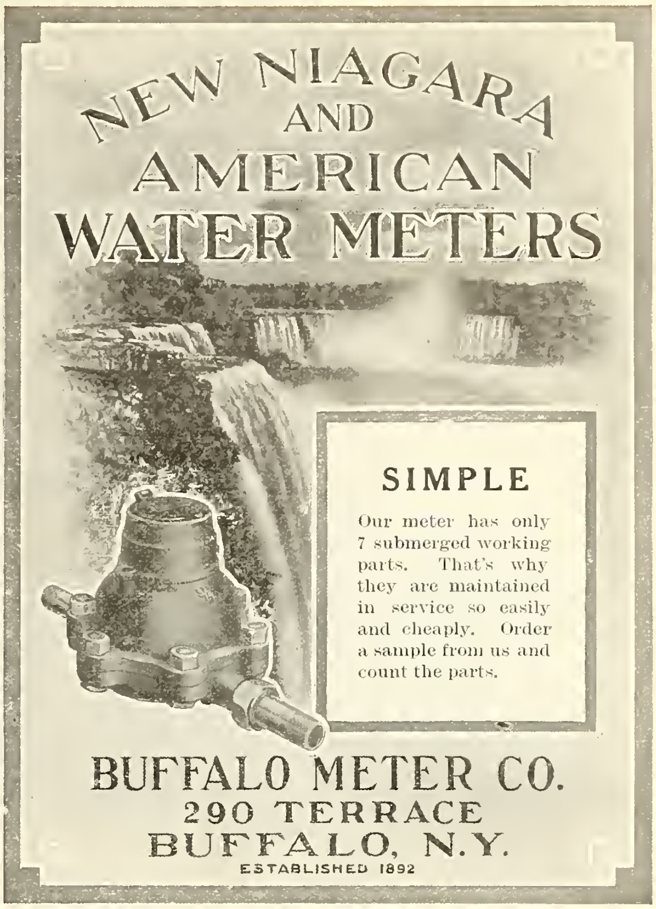
Worcester, Mass.



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SIMPLE

Our meter has only 7 submerged working parts. That's why they are maintained in service so easily and cheaply. Order a sample from us and count the parts.

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We are manufacturers of a very complete line of tents for engineers' and contractors' use and can make shipment the same day as order is received.

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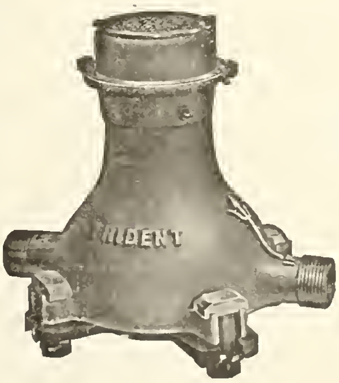

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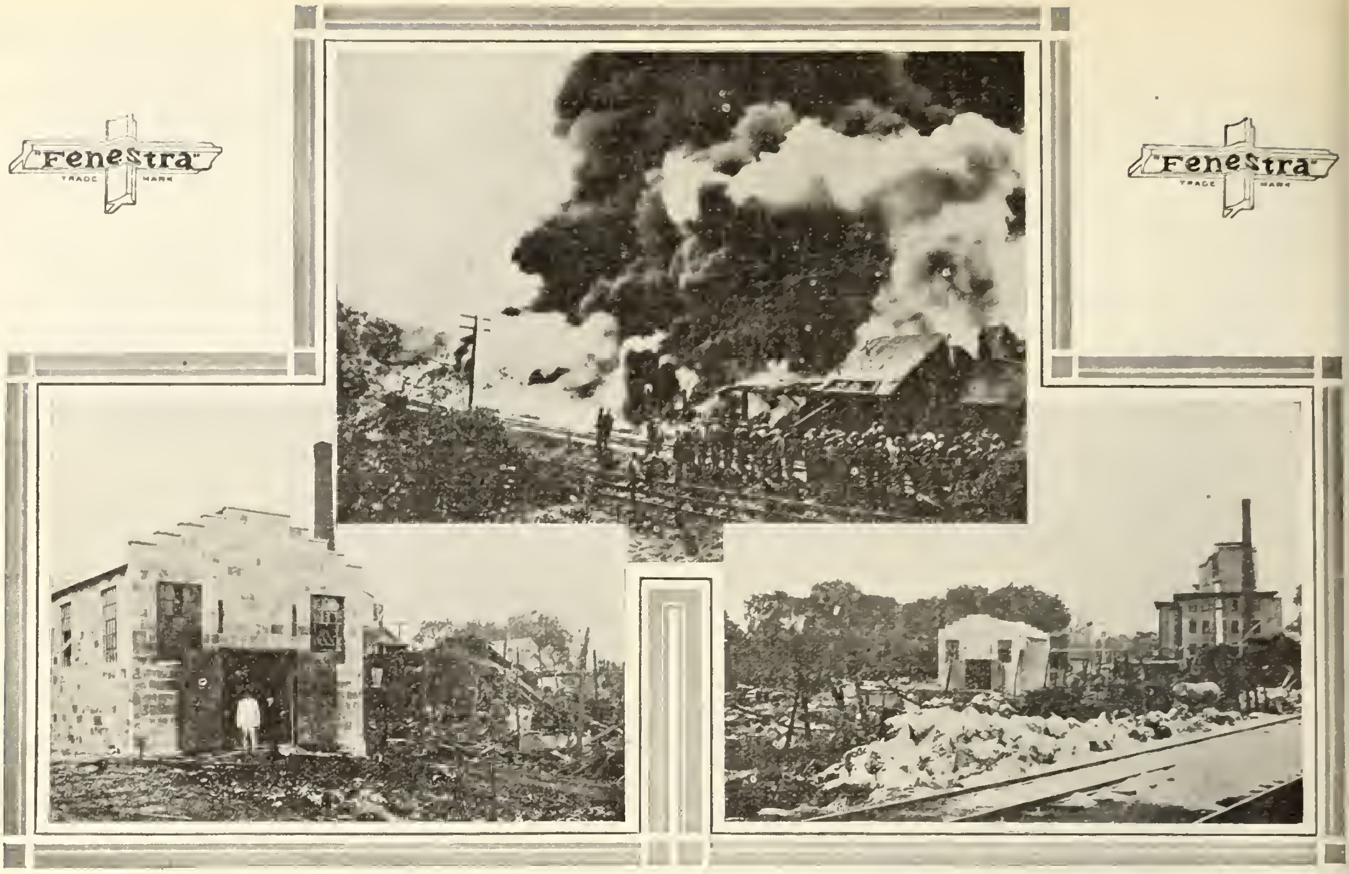

Is "Fenestra" Sash Absolutely Fireproof ?

WHEN the plant of the Vera Chemical Co., at Stoneham, Mass., with its contents of 2000 barrels of rosin and turpentine went up in smoke in September this question was again answered emphatically and convincingly.

The photographs tell the story. It will be seen that the small stone building, which was equipped with "Fenestra" Sash, was almost surrounded by the other buildings, and that when the fire took place it was enveloped by the heat and flames.

As the lower cut shows plainly, though the heat was severe enough to literally melt some of the glass out, the sash itself is entirely intact and uninjured. It has since been reglazed and is to-day in use.

Had this building been equipped with *wood sash*, of what use would its heavy stone walls and metal-clad fire door have been to protect the highly inflammable contents from the flames ?

Even the ordinary so-called "fireproof" hollow-iron window with its big exposed panes would have collapsed five minutes after the flames reached it, leaving the " fireproof" window with its "automatic closing device" little more than a metal rim in a stone opening.

Only a sash of *interlocked solid-steel bars* permitting the use of *small panes* can withstand the ordeal of intense and continued heat like this and "FENESTRA" Sash is absolulely the only sash made of this description.

If you have a building in view for which you would consider Steel Sash let us send you our new 1912 Sash Catalog.

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Hand and Power Driven

OVERHEAD TRAVELLERS WORKED FROM ABOVE OR BELOW
FORGE OR FOUNDRY CRANES IN STEEL OR WOOD
WHIP OR PLATFORM CRANES FOR WAREHOUSES, ETC.
WALL OR COLUMN CRANES—USEFUL IN ALL PLACES
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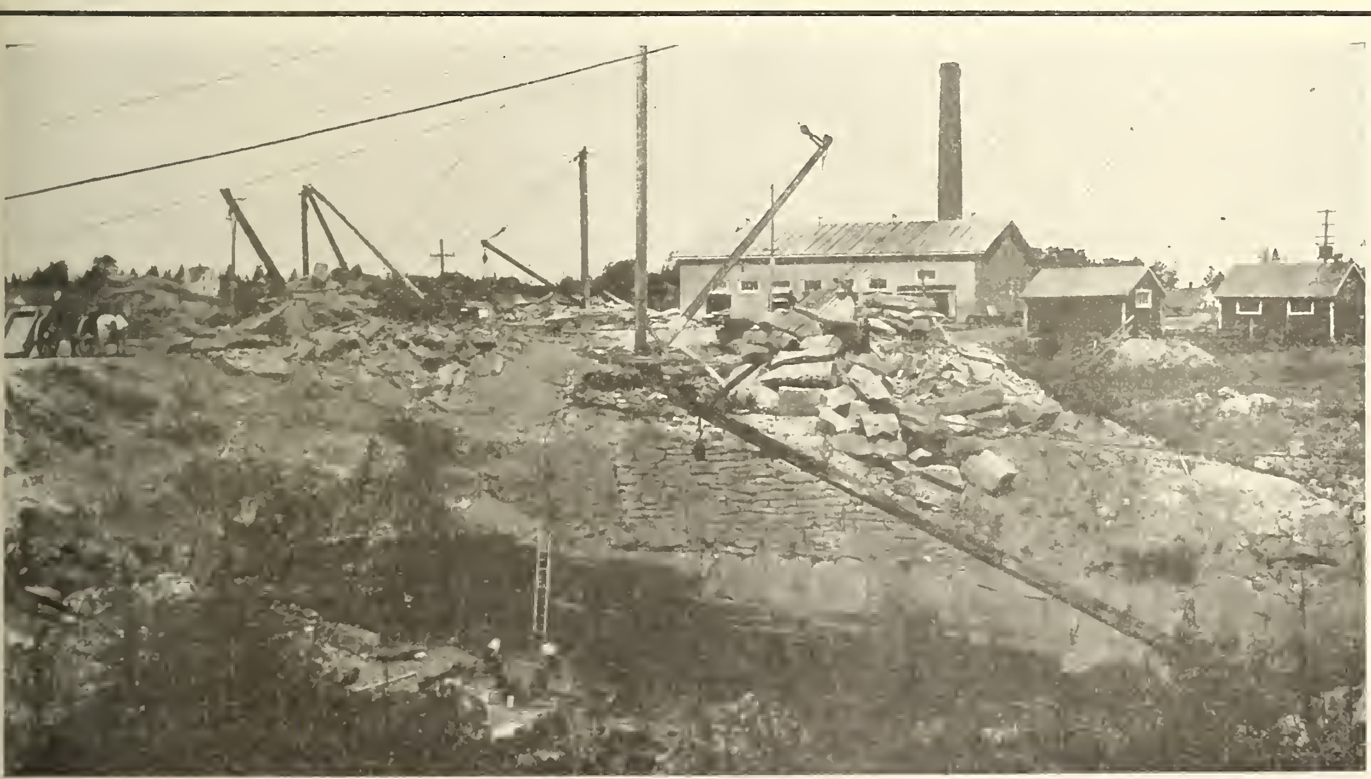
DERRICKS OF EVERY DESCRIPTION. STEEL OR WOOD

Our **HAND CRANES** combine lightness with strength and special care has been taken to so proportion the parts that the load may be raised with the least expenditure of manual labour.

Our **POWER CRANES** will be found speedy in action, and on examination will show that we allow a larger margin of strength in proportion to the power than most other manufacturers.

Our experience and advice will be found worth having; let us know the nature of your business and we shall be pleased to advise the best equipment for your purpose.

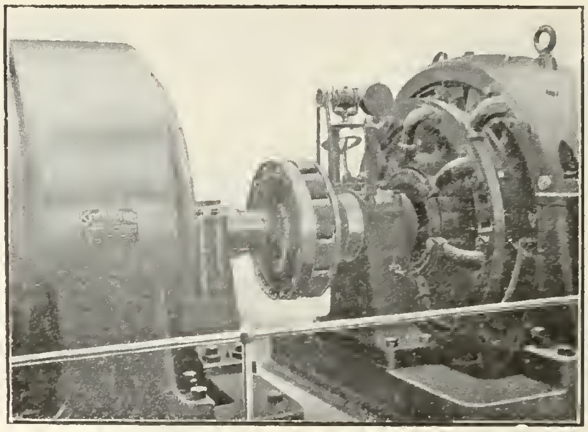
International Marine Signal Company, Limited
OTTAWA, ONTARIO



Block Stone, Dimensions, Random, Head Sills, Shoddy, Stone Sawing

Sackville Freestone Co., Limited, Sackville, N. B.

WRITE US FOR QUOTATIONS



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For High and Low Speeds

Save Power

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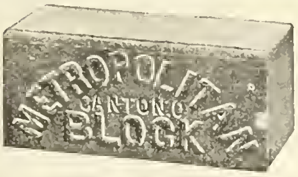
PLAIN ROUNDS.
& SQUARES.
COLD TWISTED
SQUARES

MAXWELL
DEFORMED BAR

STEEL BARS
for Reinforcing
Concrete

This Chief Engineer says :

"Best Paving Block Made"



Quality is Economy
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"The result of tests made for our Office by the Maryland Geological Survey of twenty-six brands of Paving Block showed your Metropolitan Block the best."

(His name, address and report is in our Booklet. "What Experts say about Metropolitan Paving Block."—Ask for a copy.)

"Metropolitan Block"
Make Permanent Pavements

The Metropolitan Paving Brick Co. **Canton, Ohio. U.S.A.**

THEW SHOVELS

STEAM SHOVELS THEW HORIZONTAL CROWDING MOTION LORAIN FULL CIRCLE SWING

The THEW SHOVEL has revolutionized the methods employed for cellar excavating, street grading, road construction, and light contract work in general

The contractor whose equipment includes one of these light shovels, capable of doing the work of thirty or more laborers and economical if it replaces only four or five men, can underbid the contractor who is not so equipped. He can move a given yardage in a shorter time, at a lower cost, and with less trouble. He is recognized as up-to-date in his methods, is given an opportunity to figure upon the best jobs, and will usually receive the preference, other conditions being equal.

The THEW SHOVEL will handle cuts as shallow as 12 inches and give economical results. It will rip up old macadam and handle rough, stony ground most effectively.

Send for Catalogue. C.R.

THE THEW AUTOMATIC SHOVEL CO., Lorain, Ohio

Canada Steel Co., Limited, Hamilton, Ont.

(Independent of all mergers)

Manufacturers of **STEEL**

For Reinforcing Concrete.
Plain Rounds, Squares or Twisted Squares.
Cross Arm Braces, plain and galvanized.

ANGLES from ¼ x ¼ in. up to 2 x 2 ins.
ROUNDS and SQUARE from ¼ in. up to 1¼ ins.

We can ship from stock

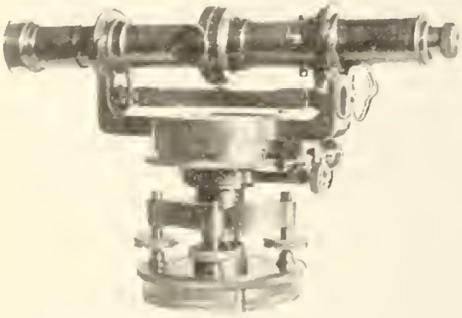
FLATS from ¾ in. up to 4 ins. in width, and other special sections.

Ask us for prices—they will interest you.

Office and Works : Sherman Ave., North

"Watts" New Architects and Builders Convertible Level

(Combined Transit and Level)



Sighting a horizontal line: telescope in "Y's

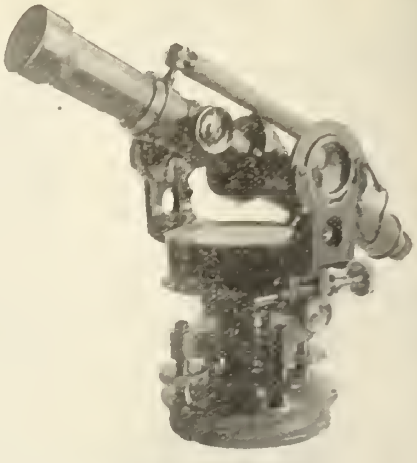
Surpasses any instrument of its kind sold in Canada

FEATURES

New "Y" Adjustment:

Traversing and centering movement to lower plate. Very long inner centres. Most rigid and permanent in adjustment, and tested for extreme accuracy.

Price Complete **$95.00** Code Word "Justus"



Sighting a vertical line: trunnions in "Y's"

SPECIFICATION

Powerful achromatic telescope, having screw focussing eyepiece and object glass giving large field, cross hair diaphragm, sunshade and dust cap, rack and pinion movement. "Y's" fitted with new adjustment—simpler, more direct and easier to effect than on any other make of instrument. Graduated level bubble. Compass divided to degrees, with edge bar needle, vernier reading to five minutes. Clamp and slow motion screw. Caps to protect screw joints on telescope. Four-screw levelling adjustment, with centreing motion. Base provided with screw sockets to take trivet points—no separate Wall Tripod being required. Complete with full kit of accessories, in polished mahogany case, and split leg new pattern tripod.

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THERE ARE three continuous, independent opposed mixing actions in the Koehring drum, any one of which produces as much mixing as the entire mixing action of most other mixers.

And the important feature is that the actions being independent and opposed to one another there is an intermingling of the entire mass of material contained in the drum.

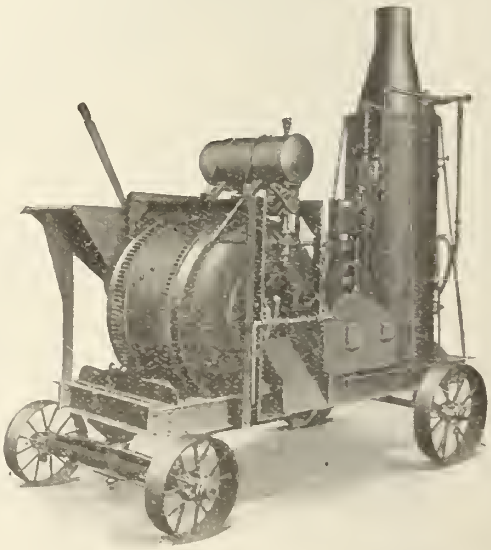
Three opposed mixing actions also make impossible a series of flows, such are produced by mixers depending on the form of the drum or a series of blades or scoops, in which the fine material gravitates to the bottom and the coarse collects on top.

This three-in-one mixing action, producing a perfect intermingling of the entire mass, is a guarantee of the largest quantity of perfectly mixed concrete in short time not equalled in the mechanical design of any other mixer.

And since mechanical mixers are only used to produce more of better concrete than can be mixed by hand, this improved Koehring principle of mixing must be the most important feature to every discriminating user of mixers.

And we are just as anxious to tell you about the improved mechanical features of the Koehring Mixer, fully illustrated and described in our new 1912 catalog of nearly 100 pages.

It's a book that not only describes the Koehring Mixer but contains valuable concrete tables that makes it practically indispensible to every user of mixers. A copy will be sent to you by first mail on request.



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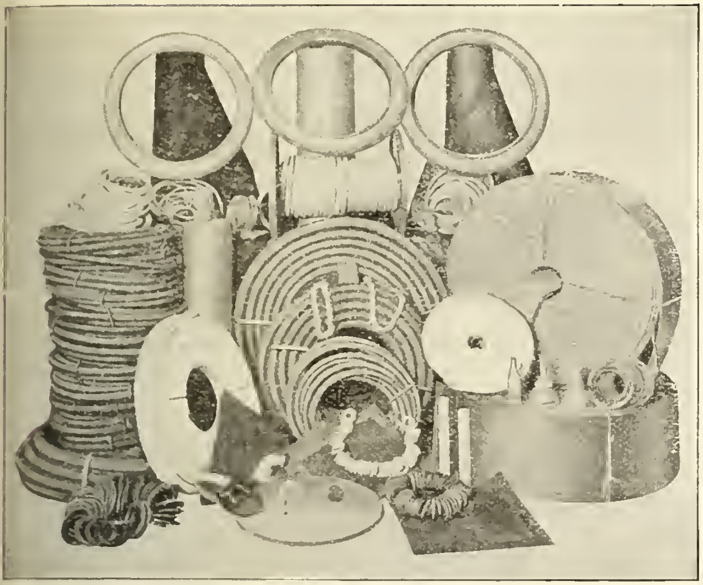
Use Goodyear Non-Chip, Rot-Proof Hose



A few of the lines we manufacture

Don't tie up money in hose that begins to need repairs after a *few week's* use.

Buy the only dependable, never-mend hose—

GOODYEAR Water Hose

Built by the World's Greatest Hose Experts for Pulp and Paper Mills, Manufacturers, Boiler Rooms, Flushing and Garden Use and All Uses Where Cold Water is Carried.

The Strongest, longest lasting hose made.

Goodyear Hose is built on principles that years of experience have proved most practical. The fabric is cut on right bias to give greatest strength and endurance and to resist expansion and elongation—one of the prevailing faults of common hose.

Only highest grade material used. Rot-proof, because specially treated and covered with heavy, durable canvas that can't chip off and expose tube to weather.

Can be furnished with round, half-round or flat wire winding or Marlin wind.

Steam Hose—Air Hose—Suction Hose

We manufacture highest grade hose for every purpose. Used throughout the Dominion. Wherever used, is *saving money.*

All Goodyear products built according to same methods employed by Goodyear Tire & Rubber Co., Akron, Ohio—one of the best known and most successful rubber goods manufacturers in the United States.

In all of our business in Canada last year, we had to replace because of slight defects, only $155.22 worth of goods.

Tell us your requirements. Let us send catalog. Write to-day.

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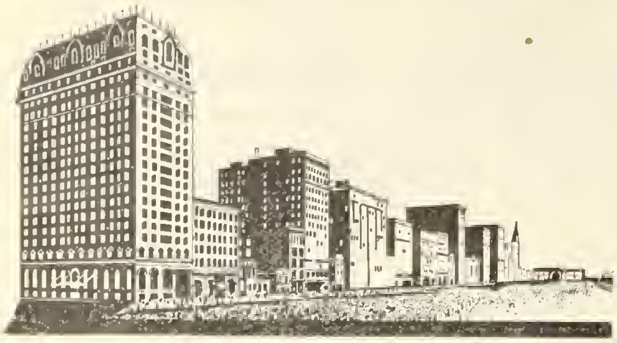
Regina, Sask., 2317-2318 South Railway St.—Hamilton, Ont., 127 King St. West.



Building Record

West ahead of the East by a big margin in 1911—Toronto has safe hold on premier position.

BUILDING PERMITS FOR YEAR

	1911	1910
Toronto, Ont.	$24,374,539	$21,127,783
Montreal, Que.	14.561,481	15,815,859
Winnipeg, Man..	17,550,000	15,106,480
Vancouver, B. C.	17,652,642	13,150,365
Ottawa, Ont.	2,997,610	3,022,350
Hamilton, Ont..	4,255,730	2,604,605
London, Ont.	1,036,880	805,074
Halifax, N. S.	508,796	630,380
Calgary, Alta.	12,909,478	5,589,594
St. John, N. B.	572,700	526,435
Victoria, B. C.	4.026,315	2,273,045
Regina, Sask.	5,099,340	2,351,238
Edmonton, Alta.	3,671,850	2,159,106
Kingston, Ont.	314,569	220,092
Maisonneuve, Que. ...	2,260,160	1,955,100
Peterboro, Ont.	345,372	517,958
Windsor, Ont.	739,575	392,040
Sydney, N. S.	495,642	347,554
Fort William, Ont. ...	3,078,010	2,381,125
Berlin, Ont.	358,095	347,550
Westmount, Que.	1,489,082	2,152,020
St. Thomas, Ont.	285,515	286,100
Brandon, Man.	1,043,929	982,385
Moose Jaw, Sask.	2,475,736	1,071,090
New Westminster, B.C.	1,058,400	
Saskatoon, Sask.	5,004,326	2,817,771
Port Arthur, Ont. .. .	597,705	892,681
Chatham, Ont.	233,000	....
Galt, Ont.	282,334	....
Belleville, Ont.	320,000	....
Woodstock, Ont.	143,200	82,000
Nanaimo, B. C.	152,611	....
Lethbridge, Alta.	1,033,380	2.211,310
North Vancouver, B.C.	772,468	....
St. Boniface, Man. .. .	1,140,735	861,870
Oshawa, Ont.	120,000	179,500
Strathcona, Alta.	491,403	363,470
Medicine Hat, Alta. ..	743.532	205,640
Welland, Ont.	342,808	245,942
Nelson, B. C.	166,700	163,430
	$131,886,775	$102,819,242

These figures show a gain of 28.2 per cent. over 1910. They give some idea of what we may expect this year. If you manufacture or sell anything that enters into the construction of buildings you should write to MacLean Daily Reports Limited, 220 King Street West, Toronto, and learn how they can help you help yourself. Their organization thoroughly covers the Dominion, and supplies news economically and efficiently, or present and prospective markets for the goods their subscribers sell. If requested they will gladly send specimen reports and rates and outline facilities for serving you.

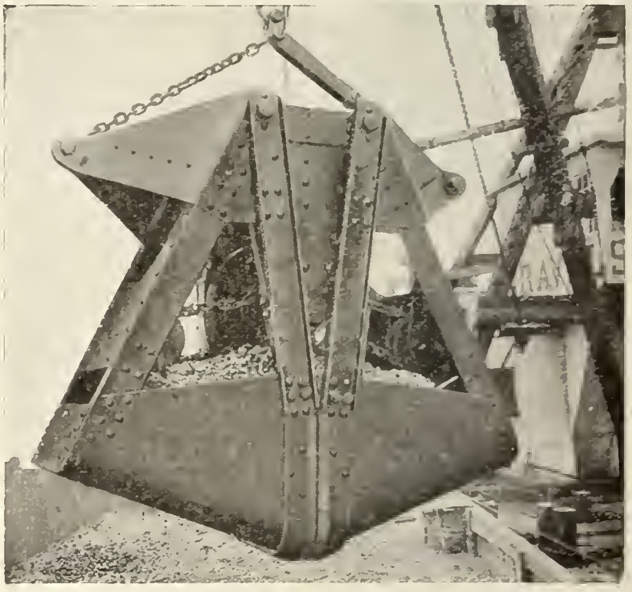
Thorne Metal Bars

Modern storefronts require a maximum amount of show window and minimum amount of bar.

See samples of our Thorne Store Front Bar.

The Hobbs Mfg. Co., Limited

FACTORIES AND WAREHOUSES:
London, Toronto, Montreal, Winnipeg



Andresen-Evans Grab Bucket

LOADED WITH GRAVEL

Note the capacity. This is due to the powerful digging action. Opens wide—50 per cent. greater than Clam Shells, cutting action extends over a stroke one-half longer, and is therefore a better filler.

FULL BUCKETS ASSURED QUICK OPENING ASSURED
POWERFUL CLOSING EFFORT

Rugged—Sturdy—Durable—Simple. No small sheaves to wear cables. No complicated machinery—no sliding frictions. Built of structural shapes and plates solidly riveted together.

Built for 2, 3 or 4 line operation. Sizes 1 to 8 cu. yards.

H. P. ANDRESEN 910 Chamber of Commerce Bldg.—113 W. Washington Street, Chicago.

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J. & J. Taylor
Toronto Safe Works
Established 1855 TORONTO
Branches: Vancouver and Winnipeg
Montreal

We Want Just One Order

After we have had **that one,** you will be so pleased with the prompt shipment and extra high quality of our material, that **all** your orders will follow the route of **that one.**

Toronto Warehouse

STEEL

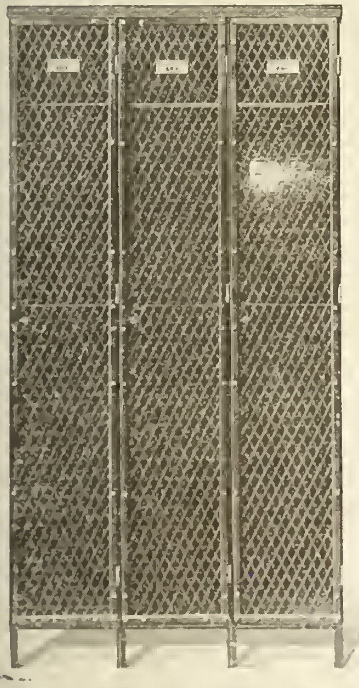
Mill Shipments

Factory Products, Limited

STEEL DEPARTMENT

220 King Street West - TORONTO

'Meadows' Metal Lockers



Make friends because of their substantial construction and unique features. We make several styles and sizes of these lockers. We'll know what you want if you just hint at your requirements.

Send for our interesting booklet entitled

"Locker Lore"

GEO. B. MEADOWS

Toronto Wire, Iron and Brass Works Co., Limited
TORONTO, CANADA

RADIAL BRICK CHIMNEYS

Our Improved Perforated Radial Bricks, with corrugated sides, are manufactured from the most selected clays, mixed in accordance with our formulae and burnt in specially constructed kilns, at temperatures best adapted for the purposes for which they are to be used.

Write our nearest office for Catalog No. 38.

THE CANADIAN KELLOGG CO.
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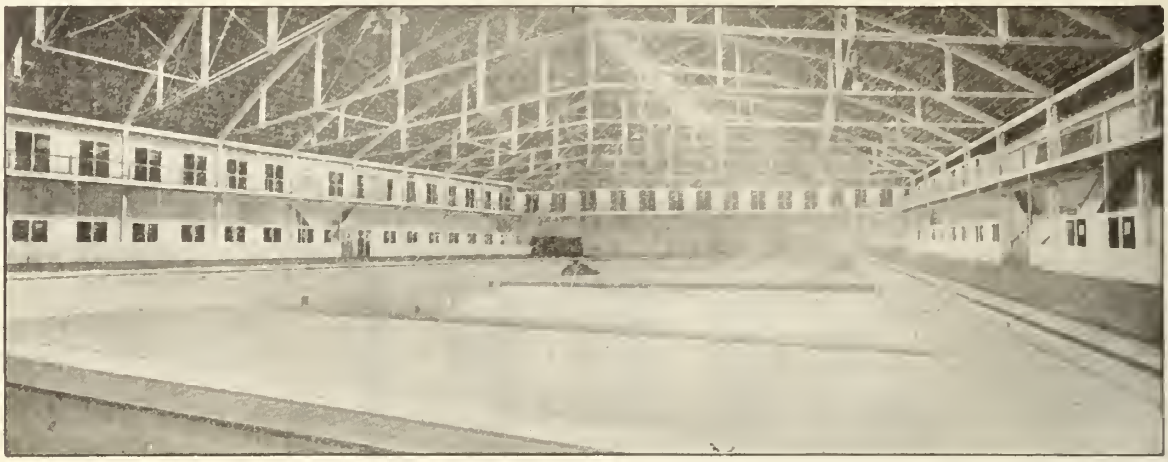

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Glencoe Lime & Cement Co., St. Louis. St. Louis, Mo., Nov. 8, 1908.

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ESTABLISHED 1886

Contract Record and Engineering Review

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> "We dread the blows we never feel,
> And what we lose is yet by us lamented."
> —Goethe.

Federation of Building Interests

THE Canadian National Association of Builders is shaping in a manner that promises much for the interests of those identified in any way with construction work throughout the country. It is only a few short years since the Association was organized and already it is becoming a power in legislative and labor circles. There never was a time when there was greater need for organization in the building industry, and the system of both provincial and federal organization adopted by the C.N.A.B. is an excellent one, controlling so thoroughly, as it does, every possible source of trouble from within and without. This Association should receive the loyal support of every master builder and its aims should be prosecuted with enterprise and vigor, for there is a great field for its work. During the last decade many developments have taken place in the industry and there have been remarkable changes in construction—all of which has opened up great possibilities. The operation of the trade has widened into many new channels. In these respects the industry may congratulate itself, but it must see to it that it does not expand in individual units: that there is some central force,—an organized unit that will hold the many parts together. With the growth of the country we may be sure that legislative and industrial troubles will increase, and with the growing influence of the labor interests it is certain that efforts will be made to enact legislation unfavorable to the master builder. In such matters as these the C.N.A.B. has a great opportunity. It rests with the rank and file of the building community to see that this tide of opportunity is "taken at the flood" and that the "whole voyage" of the industry is not "bound in shallows and in miseries" as a result of their neglect or apathy.

An association of this kind can and does do much to improve the relations between the builder, the architect and the engineer. Hostility in any ranks constitutes a sure setback. Often all that is required to establish good feeling and to remove unfavorable elements is just such a medium as we are discussing.

Then, again, a federal association of this kind is able to co-operate with other powerful organizations—such for instance as the Canadian Manufacturers' Association. We recollect with much interest how the president of the C. N. A. B., Mr. E. T. Nesbitt, of Quebec, expressed his desire that the Association should develop along the same lines as the organization of the Canadian manufacturers. The pattern is a good one and the combined influence of two such bodies would be a valuable asset to the employers of the country.

Lastly, we would urge that the master builder and contractor have a well defined duty in the matter of supporting such an association. Even if they are so well posted on every detail of their business that it is impossible for them to acquire any additional information from papers, addresses and discussions, they should remember that they acquired that same superior knowledge from the industry, and they should recognize the fact that they are indebted to some extent for their own progress to the example and enterprise of others. A man may get through life and even attain some success in his business without concerning himself with the aims and ideals of his fellows, but if all men were of that type the tables would quickly be turned and many of those who are now thriving—thanks to the enterprise of others—in their own business might, perhaps, have to carry the hod. This is the day of **organization**—and organization is **unity,** which is **strength.**

Purchasers, Contractors and Consulting Engineers

SUGGESTIVE points are to be noted in the inaugural address delivered recently by Mr. Michael Longridge, President of the Manchester (Eng.) Association of Engineers. The chief feature of the address was that portion devoted to the specifications for the design, manufacture and sale of power plants, and incidentally to the mutual relations, duties and interests of purchasers, contractors and consulting engineers. With regard to the purchasers the author briefly explained the methods adopted in drawing up specifications and placing orders on the lowest tender system. Although under this system he said orders could be placed at exceedingly low prices, on the whole he questioned whether those who adopted it got as good value as others who employed and paid professional advisers. The objections to such a method, however, were mentioned. The contract prices were too often supplemented by bills for extras, and the completed work marred by make-shifts. The guarantees were found to be elusive, because the conditions demanded for the tests were not to be obtained, and the work generally failed to satisfy, not because manufacturers were dishonest, but because purchasers did not know what they really needed. From the contractor's point of view the practice was also unsatisfactory. The preparation of preliminary plans, with the knowledge that except in rare cases they would not be paid for, and might even be handed over to a competitor to be carried out, took all the pleasure out of the work, and the too frequent quarrels over the extras and final reductions of already cut prices to get a settlement after completion of the work created disgust.

In other cases mentioned the directors sent the plans, specifications and tenders received to a consulting engineer asking which of the plans and tenders was the most advantageous. The consultant could tell them which of the plans submitted was the best from a purely engineering point of view, but whether that plan was the most suitable, having regard to the local and trade conditions and possible future requirements of his employer he could not tell. The directors then made their bargain with the contractor selected and a more or less formal contract followed. The author then went on to relate the troubles which cropped up regarding the inspection of the work. Here he suggested that the engineer inspecting under an indefinite and ambiguous specification should have regard to the price at which the work was taken and the style of design and finish customary at the shop at which the work was done.

The Part of the Engineer

Mr. Longridge advocates the employment of an experienced engineer to advise what should be done, to draw up the specification and contract, to supervise the work during construction and test it when complete. Having thought out one or more schemes and laid down their main features on paper the engineer should take the drawings to his employer and discuss them on the site of the intended work to see that they are practicable, to decide which is the most suitable, and to make sure that all necessary work, especially all connections to existing machinery, have been considered. Thus only will makeshift alterations during the progress of the work and bills for extras on completion be avoided. This work completed, he might proceed to draw his specifications according to the following methods: First, to describe the plant and its accessories in detail, the dimensions of the principal parts, the materials to be used, the methods of manufacture to be adopted, the tests to be applied, and the conditions under which these last are to be carried out; secondly, to state only what the plant or machinery has to do and what tests it will be required to pass, leaving the contractor free to obtain the specified results in his own way. Both were open to objection. A specification drawn in great detail might add unnecessarily to the cost of manufacture and therefore to the price charged to the purchaser, by compelling the contractor to make new drawings and patterns where old, but for the restrictions of the specification, would have served. It was also perplexing to the estimator in the office and harassing to the foreman in the works. It was a source of anxiety and risk to the contractor, and often laid an unfair burden on the shoulders of the engineer, for the contractor would certainly attribute every mistake and imperfection of workmanship to its prescriptions rather than to faults of his draughtsmen, artisans and machinery.

On the other hand, if the consulting engineer specified only the results required and left the contractor to obtain them how he would, he was inviting his client—unless he were dealing with the standard designs of well-known makers—to open his purse and shut his eyes and take the contractor's ability and honesty on trust.

Contractors' Specifications

Mr. Longridge mentioned a third method, which is familiar. It consists in inviting would-be contractors to send in specifications and drawings for the work required, and making use of these without acknowledgement or remuneration, to compile a specification embodying selections from the originals with additions from the inner consciousness of the engineer. The new specification is put forward as the engineer's, and contractors are asked to tender to it, and sometimes to pay for the privilege of tendering. Many of these specifications, like the nostrums of a mediaeval leech, are made up of the most incongruous ingredients and are apt to disagree with the contractor who accepts them; also the fee to be paid for them is often in proportion to their complexity.

The author made an appeal to the manufacturers of power plants, engines, boilers, gas producers, and the like to issue their own specifications, not as so many do now, in vague language, but in full detail, in greater detail than can be attempted by any consulting engineer, and let them illustrate their descriptions by photographs and drawings in such a way that the engineers who read might understand the thing that was described as accurately and completely as if they had examined the thing itself. Of course, the preparation of such specifications implied standardisation, not necessarily of dimensions, for that was not always practicable commercially, but rather of typical designs and permissible stresses. The specifications accompanying a contractor's tender would then consist of two distinct parts—one variable, defining the special characteristics of the particular plant to be supplied, the other standard, containing the description and illustrations of the designs and finish adopted by the contractor for every plant of the same kind.

Engineering and Art

AN interesting article we have just read in a contemporary page reminds us of the address given recently before the Engineers' Club of Toronto by Mr. Wyly Grier. The subject of the article is the great Leonardo da Vinci, the celebrated painter of the lost Mona Lisa and The Last Supper. He was also famed as an engineer, architect, inventor and philosopher. Mr. Grier recalled the fact that Leonardo was the inventor of the wheelbarrow and the bricklayer's hod, but from all that we can ascertain this Leonardo was the most versatile man that ever lived. There is hardly a branch of human learning to which he did not at one time or another give his eager attention. He was engrossed in turn by the study of architecture—the foundation stone of all true art—sculpture, mathematics, engineering, music and philosophy. Francis I, the monarch in whose arms Leonardo is said to have expired, declared that he "did not believe any other man had come into the world who had attained so great a knowledge, and that not only as sculptor, painter and architect, for beond all, he was a profound philosopher.

In their notes of Vassari's "Lives" the editors sum up the master's occupations and achievements in the following overwhelming words:

"He was painter, sculptor, architect, engineer, musician, philosopher, chemist, botanist and geologist. He was the first great link between Archimedes and the modern scientist. He was acquainted with the earth's annual motion, knew the laws of friction and the principle of virtual velocities, studied the fall of bodies and times of descent along inclined planes and circular arcs. He considered the laws of combustion and respiration, first explained the true nature of fossil shells, foreshadowed the hypothesis of the elevation of the continents, suggested the use of steam as a motive power in navigation, and left a sketch of a steam cannon in his "Codex Atlanticus." He (probably) studied anatomy under Marco della Torre, and we have some reason to believe that he was acquainted with the circulation of the blood. He helped the mathematician, Luca Pacioli, in one of his works, and is rather doubtfully credited with inventing the algebraical signs plus and minus. He collected plants, pressed them, and made herbaria, he also devised a method of taking leaf prints which is in use to-day. In optics, heat and magnetism, he is credited with important discoveries, including the invention of the camera obscura, and the hydrometer. In physical geography and meteorology his achievements were no less wonderful, embracing studies upon magnetic attraction and the effect of the moon on the tides. In pure mechanics he restored the laws of the lever. Signor Lombardini considers him as the originator of the science of hydraulics. His system for the canalization of rivers is still of practical value. The boring of tunnels, the erection of derricks and fortifications, apparatus for raising buildings, all came in for a share of attention, and sketches for them, with explanatory notes written backword in a crabbed hand, still remain. The breech-loading cannon, which antedated Leonardo, was improved by him. The obelisks on the Thames Embankment, London, and at Central Park, New York, were raised to position by a mechanism similar to that designed by Leonardo for precisely the same purpose. His machinery for rope-making was very ingenious, as were also his stone-sawing machines, his roasting jack, his color-grinding machine, his door-spring, and his wheelbarrow.

"The automatic file cutting machine invented by Leonardo was a worthy predecessor of that which is in use to-day. This inventor of labor saving inventions was also a poet, a philosopher, and a student of the classics, and in spite of the almost world-embracing reach of his speculation, he seems to have regarded painting as his work in life."

A pioneer Japanese reinforced concrete warehouse, two storeys high and 500 x 132 ft. in area, has recently been built in connection with water-front developments at Kobe. In a paper describing this work read before the Institution of Civil Engineers, the designing engineer, Mr. Naoji Shiraishi, states that it is one of the first Japanese structures of its kind where modern methods of handling the concrete was employed. The building is of the ordinary slab and girder type, with its floor system supported on lines of columns spaced, in general, about 18 ft. on centers. The concrete was machine mixed in the proportions of 1:2:4 and a wet mixture was used. The reinforcement and the cement used on this work were both manufactured in Japan. The various forms were supported on a falsework made up of poles of cedar tied together with rough ropes of twisted rice stalks, and it is stated that almost any form of truss can be thus set up in a short period of time. When forms of this character are erected they are stated to be capable of giving support to a considerable load.

The Window Glass Trade

As is usual at this time of the year the glass jobbing trade is very quiet. There is every indication, however, that there will be a large demand during the coming season. In view of the exceptional activity promised in all lines of building construction it is noteworthy that with the present conditions obtaining in the European market there is no immediate prospect of glass arriving more freely this year than last.

In the United States the machine interests are now engaged in a death struggle with the hand manufacturing plants. The final outcome is inevitable: the hand plants must succumb. More window glass is being sold in the U. S. to-day than ever before and their prices now so closely approximate the European prices that in any desirable specifications American window glass has been able to enter the Canadian market. This condition, however, is only a temporary one and is due to the glass trade conflict there. It is anticipated that with the arrival of the early summer months the part of the machine manufacturers will be decisive, and there is every reason to believe that the prices will then return to their own level. It need not, therefore, be expected that when the active building commences there will be any quantities of glass supplied us from our neighbors to the South.

The English manufacturers in the revival of trade in Great Britain in 1911, found their capacity taxed to the utmost, and any surplus which they have had has generally gone to more profitable markets than Canada. The Canadian English connection, however has been supplied but at materially increased prices and in diminished quantities.

Belgium, which is the world's market, manufactured last year approximately 40,000,000 cases. With the exception of one Belgian plant all the rest are members of the syndicate which regulates the production and selling prices. The increased demand during 1911, together with the higher selling prices, made a profitable year for the manufacturers. At the present time there are no evidences that the world consumption in 1912 will fall behind that of 1911, in fact the demand should be normally increased. Since the Fall of 1911 there have been two increases in price to the Canadian jobbers and there are constant rumors at the present time of a further increase. This has not yet materialized. The Canadian prices, however, will be further increased owing to the fact that the International Mercantile Marine, in association with the C. P. R. Steamship Company which controls the ocean traffic to the North Atlantic ports, have announced freight increases on window glass for the present year amounting to about 33-1/3 per cent. of the 1911 ocean rate.

Combined, these various costs mean dearer window glass. That which was selling at 30 and 10 per cent. and 40 per cent. off the $4.25 base list of 1911, is now selling at 30 per cent. discount. This advance, however, does not equal the increased cost, to meet which the prices should average between 20 and 25 per cent. off the present list. This, however, is not a serious matter for the builder, as window glass is an exceedingly cheap article, and the difference in price between the lowest figure of last year and the probable highest figure of this year would not average more than 75 per cent. per 100 feet or ¾ of a cent per square foot of glass.

Master Builders to Convene in Toronto

Sixth Annual Meeting of the C. N. A. B., Feb. 20-22—The Association's Great Work—Programme of Sessions

THE sixth annual convention of the Canadian National Association of Builders will be held at the Builders' Exchange, 2 Berti street, Toronto, February 20-22.

During the past few years this Association has attained a position of truly national importance and it is confidently expected that the forthcoming meeting will be the greatest and most historical gathering of master builders yet held in Canada. The enlarged scope of the Association was commented upon last year by our western correspondent in his introductory remarks relating to the Winnipeg convention. "After years of labor," he commented, "the Association is beginning to realize the objects for which it was primarily organized. The national character of the Association was never more in evidence than during the sessions held in Winnipeg and doubtless within a brief time it will become one of the leading factors in the development of Canada." Thanks to the zealous work of the President, Mr. E. T. Nesbitt, of Quebec, and his energetic officers, the Association has made rapid strides. That which was prophecy a year or so ago has come to be an accomplished fact. The federation of the building interests of the country has been a work of national significance. The C.N.A.B. has amply justified its organization.

Mr. E. T. Nesbitt, Quebec, President

The founders of the Association realized that with the development of a young and vigorous country like Canada energetic measures would have to be taken to cope with the increasing and threatening influence of the labor bodies. At the outset one of the chief difficulties lay in the indifference manifested in the master builders' own ranks. This, however, was overcome in time and in some cases those who were the most apathetic have become the most enthusiastic.

It will hardly be necessary to dilate upon the objects of the Association, as these are very generally known. Its principal work is in watching federal legislation and in contesting every inch of ground with the labor forces, and not only in contesting but in recovering lost ground, in which respect the Association has been singularly successful during the last year or so.

We have alluded to last year's convention at Winnipeg. In this connection there are one or two points that are interesting to recall at this time. The annual banquet held in Manitoba Hall, which was attended by 642 persons, was one of the most noteworthy of

Mr. R. J. Lecky, Regina, Provincial Vice-President for Saskatchewan

Mr. J. H. Lauer, Montreal, Secretary-Treasurer

Mr. Jas. Ballantyne, Montreal, Provincial Vice-President for Quebec

Mr. D. J. McKay, Regina
Director

Mr. E. R. Dennis, London
Director

Mr. W. E. Ramsay, Montreal
(Committee on Legislation)

the kind ever held in the western metropolis—and indeed in the Dominion. Another item of interest is that the sixth annual convention only came to Toronto by one vote, there being a tie between Toronto and Calgary. The deciding vote was given to the former city by the Winnipeg Exchange. There is still another point and one of no less interest: the president of the Association, Mr. E. T. Nesbitt, who has worked so enthusiastically and unselfishly for the Association, and to whom much of its progress—in a national sense—is due, is concluding his second term of office.

Altogether the forthcoming convention teems with interest and importance. Assurance has already been given that the western exchanges will be well represented, and the opportunity to visit Toronto and to take a share in this work will doubtless be regarded as an opportune one by numbers of builders in the east, north and central portions of the country.

Programme of Sessions

On the opening day, February 20, there will be a meeting of the executive council at which legislative matters and other important topics will be discussed.

On Wednesday, February 21, there will be a civic reception by the Mayor and an automobile drive—given by the city. The opening business session of the Convention will be held at 2.30 in the afternoon. A feature of this meeting will be an address on Technical Training, by Professor McKay, principal of the Technical School of Toronto. In the evening, at 8.30, a smoker will be held at the St. Charles Hotel.

Two business sessions will be held on Thursday, February 22, followed in the evening by a banquet at McConkey's restaurant. A number of interesting papers will be given at the Thursday sessions: Mr. J. P. Hynes, architect, Toronto will give an address on Town Planning; Mr. F. W. Wegenast, secretary of the legal department of the Canadian Manufacturers' Association, will speak on Workmen's Compensation for Injuries; and Mr. C. R. Young, the well known consulting engineer, will discuss the building code of the city of Toronto.

The officers of the Canadian National Association of Builders are as follows: President, Mr. E. T. Nesbitt, Quebec; vice-president, Mr. Geo. W. Boughton, Edmonton. Provincial Vice-Presidents: Quebec—Messrs. James Ballantyne, Montreal; Ontario—Mr. George Gander, Toronto; Manitoba—Mr. Fred. H. Davidson, Winnipeg; Saskatchewan—Mr. Robt. J. Lecky, Regina; Alberta—Mr. R. A. Brocklebank, Calgary. Board of Directors, representing constituent exchanges: Quebec, Mr. Arthur Picard; Montreal, Mr. J. P. Anglin; Ottawa, Mr. J. Lackey; Toronto, Mr. John Aldridge; London, Mr. E. R. Dennis; Winnipeg, Mr. Chas. W. Sharp; Regina, Mr. D. J. McKay; Calgary, Mr. W. Aldridge; Edmonton, Mr. C. C. Batson; Lethbridge, Mr. H. J. Goode. Committee on Legislation: Messrs. G. Silvester (Calgary), John Aldridge (Toronto), J. W. Morley (Winnipeg), W. E. Ramsay (Montreal), and L. H. Martyn (London). Committee on Resolutions: Messrs. E. T. Nesbitt, J. W. Aldridge, W. H. Carter, E. R. Dennis, H. J. Goode, Geo. Gander, D. J. Mackay, J. H. Lauer and G. W. Boughton (Convener). Secretary-Treasurer, Mr. J. Herbert Lauer, Montreal, Que. Auditor, Mr. Henry E. Midgley, C.A., of Montreal, Que.

Quartered Oak Flooring

When one familiar with the subject of flooring hears someone inquiring for or asking what is the finest of all flooring, his thought instantly turns to quartered oak, says the American Carpenter and Builder.

In quarter sawing oak, that is, in sawing from the heart of the sap across the rings or growth, there is brought out that beautiful figure known in the cabinet world as the splash line. Sometimes it is very conspicuous. At other times it is more subdued, but always it is attractive, takes a high polish, and is very desirable. Moreover, flooring with the quartered face presented not only polishes easily and shows more beauty of figure than can be presented in any other way, but it also wears longer, gives more service and better service.

Quartered oak flooring is manufactured in the same general widths as plain oak, and by the leading oak flooring manufacturers, into two general thicknesses, the standard 13-16 inch and the thin stock of 3-8 inch. The 13-16 inch can either be laid on or without a subfloor, depending on whether or not one intends to lay in border or paving effects.

The Builders' Exchange of Toronto, Ont.

How the Trade is Organized in the Queen City—An Institution whose History dates back to the Year of Confederation

DOUBTLESS more than ordinary interest is attached just now to the Builders' Exchange of the city of Toronto, seeing that next week its members will be the hosts of the Canadian National Association of Builders, which will hold its sixth annual convention at their headquarters, 2 Berti street, from February 20-22. This Exchange is one of the oldest and most stable organizations of the kind in the country. Its origin goes back to the Toronto General Builders' Society which was formed in February of the year of Confederation—1867. The old society passed through various vicissitudes and was re-organized after its present constitution in 1892. At that time, just twenty years ago, it is of interest to recall that the Board of Directors consisted of Messrs. Geo. Wright, T. Cannon, Jr., C. Goddard, Jas. Crang, David Williams, Benjamin Brick, Michael Murphy, Jno. Aldridge and J. L. Nichols.

The purposes of the Exchange as defined in its constitution are "to encourage and protect the building interests in the City of Toronto and County of York, to establish and maintain uniformity in commercial usages, to provide valuable business information, to avoid if possible and to adjust trade difficulties and misunderstandings, to inculcate just and equitable principles, and to promote good feeling and harmony among those engaged in the building trade, and other kindred trades, to the end that membership in this Society shall be an assurance to the public of skill, honorable reputation, and probity."

Mr. Geo. Gander, President Toronto Builders' Exchange

The affairs of the Exchange are managed by a Board of Directors composed of nine members and one representative from each trade section. Any master builder is eligible for membership and provision is made in the by-laws for the admission of those engaged in kindred trades or closely identified with the building industry. The Association is divided into various trade sections, each of which has the power to enact its own by-laws, subject to the general act of incorporation and the regulations governing the whole Exchange.

The present officers of the Exchange, photographs of whom are given herewith, are as follows: President, Mr. Geo. Gander; 1st Vice-president, Mr. Chas. Bulley; 2nd Vice-president, Mr. Geo. Oakley, Jr.; Treasurer, Mr. Jno. Aldridge. Executive Board: Messrs. E. J. Curry, A. Dinnis, G. W. Britnell, Frank Ryan and Walter Davidson. The Secretary is Mr. Peter Lyndon Fraser, who has held the office since March 1, 1909, and discharged the duties appertaining thereto with marked efficiency.

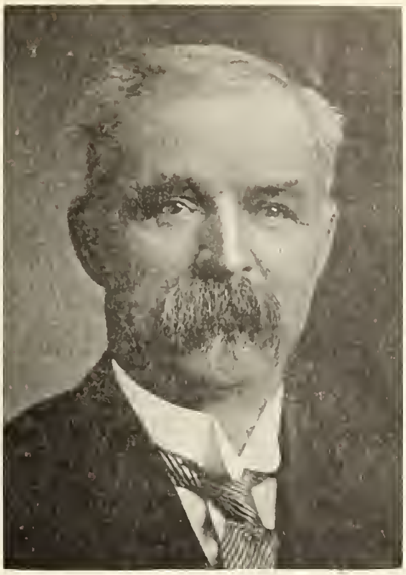
Ontario Builders Organizing Provincial Association

During the convention of the Canadian National Association of Builders which will be held in Toronto next week the opportunity will be taken by the builders of Ontario to organize a provincial builders' association. A meeting will probably be held in the Assembly Room of the Builders' Exchange on the evening of Tuesday, February 20. The Toronto Builders' Exchange has taken up this matter very enthusiastically and has sent a letter to all the builders and contractors of the province extending an invitation to be present in Toronto and to take a part in this work, and also to take advantage of the opportunity to attend the convention of the parent association.

There is every reason to suppose that this project will reach an effective consummation. For some time it has been urged by many prominent contractors throughout the province that an association is badly needed for the protection of purely provincial interests—more particularly to take care of legislative matters, such for instance as Workmen's Compensation for Injuries—one of the most important considerations —the Factory Act, Lien Laws, etc. This association would also take up the consideration of the mutual protection of building and contracting interests, while another work of inestimable value to the trades would be to bring about a general revival of the apprenticeship system.

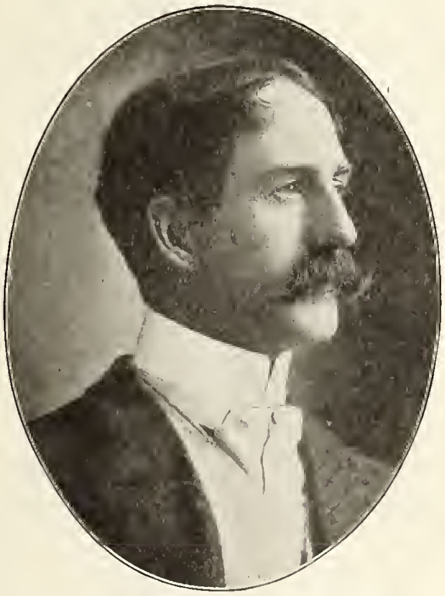
The fall of a stone minaret from the tower of the Trinity Building, New York, states the Builder, emphasizes the necessity for exceptional care in the design and construction of lofty structures. In this case the minaret weighed about 200 lb., and fell from the height of 275 feet above the street. On reaching the pavement it was smashed into numerous fragments, which flew in all directions, causing injury to some innocent pedestrians. As it is stated that the minaret was torn from its pedestal by a large flag, it is obvious that the element of contingent risk had not been taken into account so fully as could have been desired.

Mr. Geo. Oakley, Jr., Vice-President


Mr. Jno. Aldridge, Treasurer

Mr. Chas. Bulley, Vice-President

Mr. G. W. Britnell, Director


Mr. Arthur Dinnis, Director

Mr. E. J. Curry, Director

Mr. Walter Davidson, Director

Mr. P. L. Fraser, Secretary

Mr. Frank Ryan, Director

OFFICERS OF THE TORONTO BUILDERS' EXCHANGE

Calgary—The City of Meteoric Progress

Mainly about the Builders' Exchange—A Live Association that is Taking an Enthusiastic Part in the Work of the C. N. A. B.

CALGARY, of all the younger cities of the Dominion, has distinguished itself as a city of meteoric progress. We are told that it "is the commercial centre of fifty million acres of rich farm, grazing, timber and coal lands, the development of which has hardly begun."

Development has hardly begun, and yet Calgary is a city of six miles square, having a population of rather more than sixty thousand! "Hardly begun," and yet Calgary is already the sixth in the commercial centres of the Dominion! "Hardly begun," and yet it could expend something like thirteen million dollars on building last year!—But this could be continued almost indefinitely. It suffices that the city of Calgary, the people of Calgary, the institutions of Calgary, and above all the progress of Calgary, have been very much in the public eye of late. All of which furnishes us with a tenfold excuse for making some mention of the Calgary Builders' Exchange, which is by no means a laggard in the procession of progress.

This association is now in a flourishing condition. Its membership stands at about a hundred and a quarter and is constantly increasing. One of the prime movers in the organization of the Exchange was Alderman R. A. Brocklebank, last year's president, and one of the leading contractors of the city, who has devoted himself, heart and soul, to the interests of the contractors of Calgary and vicinity.

At the annual meeting of the Exchange, which was reported in the January 24 issue of the Contract Record, Mr. J. W. Aldridge, manager of the Calgary branch of Messrs. Geo. H. Archibald & Company (general contractors, Winnipeg), was elected president; Mr. Geoffrey Silvester, secretary of the Calgary Silicate Pressed Brick Company, Limited, was elected vice-president; Mr. W. J. Richards, 2nd vice-president; Mr. J. H. Garden, 3rd vice-president, and Mr. James Marr, sergeant-at-arms. The new directors elected were: Messrs. P. S. Woodhall, R. A. Brocklebank, Robert Macfarlane, J. M. O'Rourke, Thos. Tucker and J. Priestly. The Secretary-Treasurer is Mr. Arthur Chamberlin, who was employed for five years as quantity surveyor for the Canadian Appraisal Company, of Montreal. Mr. Chamberlin's services are proving of much assistance to the members.

We regret that we are unable to publish a photograph of the new president. The last time we heard from him Mr. Aldridge was confined to his bed with appendicitis.

Mr. R. A. Brocklebank, Director (President 1911)

Mr. G. Silvester, Vice-President

Mr. W. A. Chamberlin, Secretary

OFFICERS OF THE CALGARY BUILDERS' EXCHANGE

That the efforts expended by the organizers of this association have been successful is evidenced by the fact that the Exchange now embraces the majority of the master builders of the city as well as the principal supply dealers. To facilitate the transaction of business relating peculiarly to the several branches of the building trade, the association is divided into various sections—after the manner of the Montreal and other eastern exchanges. Each section has a chairman and meetings are arranged and reports submitted to the full Board of the Exchange at the regular meetings held on the second and fourth Wednesdays of each month.

The Calgary Builders' Exchange is affiliated with the Canadian National Association of Builders, which takes the responsibility of watching Federal legislation, but an active part is taken in provincial affairs. Recently, united action was taken looking to a revision of the present Mechanics' Lien Act of Alberta, which, as existing, is regarded as practically valueless.

The Exchange was an active supporter of the scheme for undertaking a system of technical education in the city, and the excellent courses of study that have been inaugurated by the Calgary Public School Board are attributable in no small measure to its support.

In the near future the Exchange will remove to new quarters in the Travis Block, a modern building affording every facility for the various objects of the association. One of the plans in view is to institute a permanent exhibit of building materials.

And so, withal, these young western cities are not so far behind the east in the advantages and facilities they offer. Probably it is due largely to the spirit of enterprise and progress which is borne in upon the very atmosphere out there. Possibly the city of Calgary and the Calgary Builders' Exchange occupy a class by themselves. Certainly they can show their advantages—and the progress is undeniably there.

Calgary is an "eye-opener."

Builders and Contractors' Association of Essex

At the annual banquet of the Builders and Contractors' Association of Essex, held recently at Windsor, Ont., a number of interesting addresses were given, notably one by Mr. Henry Clay, barrister, on the need for establishing a Mechanics' Institute in Windsor. Mr. Clay discussed the public school as a future medium for training a boy technically. A plan suggested by Mr. Clay was that the builders of Windsor should have an institute of their own where manual training could be imparted on the most thorough and up-to-date lines. In the public schools at present only the bare elements were being taught. The average boy left school too young to derive any considerable benefit from the instruction given. The principal guests of the evening were a number of delegates from the Builders and Traders' Exchange of Detroit, Mich. Messrs. W. R. Kales and C. A. Bowen, respectively president and secretary of the last named body, and Mr. C. J. Netting spoke briefly. Mr. Kales sketched developments in building construction in this country from the day of the Indian wigwam. Mr. Netting urged that the builder should live up to a high code of ethics; that his work should be always constructive and not destructive. During the evening appropriate selections were rendered by an orchestra, while vocal numbers were given by Messrs. Jos. L. Heureux and A. Ouellete. The banquet committee was comprised of Messrs. G. W. Freeman, secretary; Mr. M. A. Brian, and Mr. Wm. Laesser.

Victoria Builders' Exchange

There would appear to be a well defined movement towards the organization of building and contracting interests in the western and coast cities. We are indebted to Mr. W. J. Cox, Secretary of the Victoria Builders' Exchange, for particulars of the brief history and work of that body. The old Builders' Exchange at Victoria was formed in 1902. It was rather an exclusive association and its membership was limited to general contractors. In May last, however, there was rather a serious strike among the carpenters and in order to ascertain the general feeling of the trade, public meetings were called. As a result of these gatherings the association gained many new members, and owing to the strength of their organization the contractors were eventually successful in the strike. This brought home to the older members of the local trade the great desirability of combining their forces and consequently the sub-contractors were invited to become members of the Exchange. The board of directors consists of two representatives from each section, and the constitution is drawn up upon the same lines as that of the Winnipeg Builders' Exchange.

One of the aims of the association is to secure a uniform contract. Hitherto the relations of the local contractor with the architect have been most unsatisfactory, and much is hoped from the uniform contract. A revision of the Mechanics' Lien Act is another pet project of the Victoria Builders' Exchange.

The officers are as follows:—President, Mr. J. W. Bolden; 1st vice-president, Mr. J. W. Crocker; 2nd vice-president, Mr. T. Hawkins; treasurer, Mr. A. Parfitt; secretary, Mr. W. J. Cox. In addition to the above, the directorate includes, Messrs. H. Cooley, S. R. Newton, A. J. Dods, J. E. Shenk, C. C. McKenzie, J. J. Knight, D. B. Plunkett, Jos. Sears and A. C. Hemming. The membership of the Exchange is about 75.

Vibration in Buildings

The following paragraphs appear in a communication from Maurice Deutsch to the Engineering Record:

The subject of vibration has of late been absorbing the attention of not only scientists but of the general public in large cities. Since the introduction of sky-scrapers, towering far above adjoining buildings, of large printing plants and power houses in large cities, various complaints of vibrations are frequently heard of . Subway trains now penetrating rock and then the softest quick-sands and the operation of heavy bed presses and reciprocating engines leave in their path a tremor to which many adjoining buildings are so naturally attuned that the vibrations are often not only annoying but dangerous, both to the building in which the machinery may be operating as well as to adjoining structures. One sometimes finds special localities to which vibrations are carried strongly while places nearer to the source may be relatively free from trouble.

In concrete-steel monolithic construction for mills and other structures, when properly designed, the entire mass acts as a unit to absorb vibrations set up in its various parts, the only tendency being to set up an oscillation of the entire structure, but this can be generally avoided if proper foundations are constructed. The 8-storey reinforced concrete Ketterlinus building in Philadelphia is an excellent type of the most improved construction for large printing plants. Though the 15 and 20 ton presses are located on the third, fourth and fifth floors, very little vibration is noticeable.

"If one-half of the money spent for fire losses were spent for better building construction, the annual loss by fire would soon begin to decrease Improvement along the line of better construction can only come gradually. It can and should be hastened in thickly settled communities by stringent building laws. City officials must be awakened to their responsibilities and the individual shown that his own pecuniary interests lie in lessening the fire waste. Old buildings cannot be torn down at once and rebuilt, but we can see to it that no more fire traps are built where they are a nuisance to other structures."

Electricity in the Cement Industry

Valuable Address by Mr. F. C. E. Burnett—Manufacturing Methods Reviewed—Types of Motors Best Adapted for the Cement Mill

Mr. F. C. E. Burnett, chief electrical engineer of the Canada Cement Company, gave an interesting address on the above subject before the Toronto section of the American Institute of Electrical Engineers on the evening of Thursday, February 1. At the outset Mr. Burnett dealt at some length with the strides made in recent years in the methods employed in the manufacture of cement. Contributing factors to the present day popularity of the material, he contended, were the rotary kilns and recent improvements in grinding and conveying machinery. In spite of the extraordinary increase of the use of Portland cement and the fact that it had become the basis of building construction, and also that it had largely supplanted stone in public works, the industry had always kept up to the demand. Indeed, the manufacturer led the way and the engineer's specifications followed in the rear.

Mr. Burnett then gave a review of the methods employed in the manufacture of Portland cement, devoting his remarks in the main to the dry process, with which most of the readers of the Contract Record and Engineering Review will be familiar. It may be of interest, however, to reproduce that portion of Mr. Burnett's remarks which dealt with crushing and grinding. Referring to a picture shown of a typical quarry where the limestone is obtained, Mr. Burnett said: "The rock is worked in benches of convenient depth, after the overlying clay and loam have been stripped. The rock has to be broken in the quarry to a size small enough to pass through the large crusher, and hence the method of blasting has to be carefullv considered. In this particular quarry, the rock is picked up by a steam shove, and dumped into the quarry cars, which are hauled to a hoist and raised to the crusher hopper level and dumped. On the top of the quarry, the other steam shovel may be seen at work picking up the clay, which is hauled by steam loco to the clay storage, and which, of course, requires no crushing. The stone is generally crushed twice, the first crusher not being employed to break it to the final size for economical drying; it is generally a single crusher of very large size, but the next crushing is done in very much smaller machines, of the same type, but which are worked very much more economically than the larger one for the final reduction of the stone to a workable size. After passing through the second crushers, the stone is generally stored in a suitable stone storage, so that a regular supply of stone is ensured to the mill, as the quarry must be worked intermittently on account of the necessity for blasting, and, of course, the milling process must go on continuously.

"Limestone, of course, in its natural state, contains a considerable amount of moisture, which has to be dried out before it can be economically ground, and the stone is therefore taken from the storage and passed through driers. These driers consist of revolving horizontal cylinders, on a slightly inclined axis, along which the stone rolls by gravity to the firing end, and thence to the conveyors. The drier is fired either by the waste gases from the kilns, or separately from the discharge end, induced draft being generally employed. The clay has to be similarly dried, the drier being of the same size and type, and both stone and clay in their passage through the driers are further slightly broken up, thus assisting the final grinding of the raw material. The dried stone and clay are then allowed to cool before being passed to the raw grinding department.

"There are mány types of grinders employed in the pulverizing of both the raw and the burned product, but probably the most strongly used are the ball and tube mills. The former consists of a short cylinder of large diameter, partially filled with steel balls, which, as the cylinder is revolved, roll on the material to be ground and hammer it to a certain degree of fineness. The ball mill is used to give the preliminary grind to the clay and stone, which are ground separately in this stage. The clay and stone are then mixed in their proper proportions, depending on the composition of the limestone, and are then fed to the tube mills, which complete the grinding to the requisite degree of fineness for burning to clinker. The tube mill consists of a large tube, anything from five to seven feet in diameter, and from eighteen to twenty feet long, revolving on a horizontal axis, and lined with a refractory material, and partly filled with flint pebbles. The raw mixture is fed into and passes through the mill by gravity, being thoroughly ground in its passage until from 92 to 94 per cent. passes through a sieve having 100 meshes to the inch. This raw grinding is of quite as great importance as the grinding of the clinker, as an imperfectly ground raw mixture will not clinker properly, and will give a poor quality of cement.

"The raw mixture is then fed to the rotary kilns, where it is burned to a clinker. The rotary kiln is a long tube lined with firebrick, revolving on an inclined axis, and fired with coal in a pulverized state, which is blown into the kiln with fans or compressed air, giving a burning temperature at the hottest part of about 2,900° Fahr. As in the drier, the raw material simply passes through the kiln by gravity, the rate of flow depending on the speed of the kiln, which is variable, and may be controlled either by mechanical means, or by variable speed motors. As the burned clinker leaves the kiln, it is quenched to kill any uncombined lime that may be present, and then put into storage to cool. It may be passed through a cooler on its way to storage, if intended for immediate use.

"After cooling sufficiently, the required amount of gypsum is added to the clinker, when the mixture is forwarded to the clinker grinding department, there to be ground in a manner similar to that in the raw grinding department, when the material is ready for use after cooling to atmospheric temperature.

"It is usually stored in convenient bins, from which it is drawn by conveyors, and either packed by hand or fed to bagging machines, to be put up in the familiar cotton sacks, or occasionally in wooden barrels."

Following this introduction Mr. Burnett came to the subject proper. The employment of the electric motor in the industry, he said, had become a matter of history. The needs of the cement mill had contributed to the development of the induction motor along certain lines. The modern cement mill was built for, and lent itself most readily to, electric motor driving. The induction motor of the squirrel cage type commended itself to practical mill men by reason of its simplicity and reliability in operation. Another motor which had a well defined use in the cement mill for hoisting and similar work was the slip-ring type, the main advantage of which was its large starting torque. This type, however, required much extra attention to keep it in continuous service. Still another type was the internal resistance motor, which, however, Mr. Burnett held in some disfavor, not on account of any inherent defect in the motor, but because it required an intelligent staff to use it properly, "and as a rule," the speaker added, "the laborer employed in the cement industry does not come under this category." The squirrel cage type easily held the field for general work in the mill and it would stand a remarkable amount of abuse. Even when mistakes were made in switching nothing serious could happen except the blowing of the fuses.

The balance of Mr. Burnett's paper was purely technical and from an electrical standpoint, but emphasis was laid upon one good point, namely, the necessity of rigid inspection. "The only way to deal with cement mill troubles," said Mr. Burnett, "is to go about hunting for them and to kill them off in their youth." The speaker had in mind the electrical end particularly, but the observation was one which is equally applicable to every department of manufacture.

In conclusion Mr. Burnett called attention to the need for adequate provision, in the designing of mills, for the foundations of all motors, as vibration was fatal to long motor life.

Effects of Freezing on Concrete

Mr. H. Burchartz has made experiments to determine the effect of frost, if any, on the subsequent hardening properties of cement, mortar, and concrete, these having been previously mixed ready for use:

Cement—Tests were made on two samples of cement, which had been prepared in the dry and wet ways respectively. The cements were mixed with water to a stiff paste, and the time taken for hardening to begin and for complete setting under the conditions stated below:

(1) The cements were allowed to set under normal conditions.

(2) The cements were kept as nearly as possible at a temperature of 0° C. equals 32° F.

(3) The cements were subjected to a temperature of—10° C. for three hours.

(4) The cements were subjected to a temperature of—10° C. for twenty-four hours.

(5) The cements were subjected to a temperature of—10° C. for seventy-two hours.

The frozen samples, viz. (3), (4), and (5), were, at the expiration of the hours stated, broken up with a hammer, and, after being allowed to thaw, were stirred for three minutes. The times for hardening and setting were measured from this point forward. It was found that preliminary freezing did not affect the times of hardening and setting. The samples kept at 0° C., however, were about four times as long as the others in reaching each stage. During the tests the temperature and humidity of the air were carefully noted. The same cements were used to make mortar and concrete.

Mortar and Concrete—The mortar consisted of 1 part by weight of cement to 3 parts by weight of standard sand. The concrete was made up of 1 part of cement to 5 parts of gravel. Two classes of each were prepared, sufficient water being added to make the mixture in the one class (1) "earth damp," and in the other (2) "wet."

Test pieces were made (1) immediately after mixing, and (2) after subjecting to a temperature of about — 14° C. (equal to 6.8° F.) for (a) three hours, (b) twenty-four hours, (c) seventy-two hours, and subsequently thawing. The test pieces were allowed to set under damp sand, some for seven days, and the remainder for twenty-eight days, and then tensile and compression tests were made.

The results showed that cooling for a few hours only had a negligible effect on the hardening of mortar and concrete, but that the rate of hardening was much lower after a prolonged freezing, this being strikingly accentuated for the "earth damp" over that for the "wet" mixings.—London Builder.

Influence of Transportation on Concrete

While French practice in concrete construction is to convey the raw material to the building under construction and there set up a contractor's plant and make the concrete as needed, some German practice has been to finish the concrete at the plant and then convey it to the building, often over long distances. The French do not favor this latter practice as they fear the action of the vibrations and shaking to which the concrete is exposed in transportation,

Herr Magens, a German engineer, has investigated this question and has made comparative tests between concrete cubes made at the plant and then conveyed longer distances to the buildings, and between concrete cubes made directly at the building and then used there. He recommends the use of slow setting cements, as also a long setting time in warm weather if possible. If the cement has set a sufficiently long time, the vibrations of the transportation will have no bad effect on the concrete. In comparing test cubes, he allowed them to set 28-60 days and then tested them, finding that the concrete conveyed long distances showed in nearly all cases a considerable increase in compressive strength, varying between 4 to 48 kg. sq. cm. (56-198 lb. sq. in.). A number of laboratories that were interested in this question made similar experiments and found the same results, the variations being from 7 to 33 per cent. in favor of the transported concrete. In general it may be said that transportation of concrete has no bad effect on the same, and in many cases has even a good effect. The results also point to the conclusion that inert material with sharp and ragged edges such as broken stone gives better results than smooth round material like pebbles and gravel. It is claimed that the shaking and the vibrations to which the concrete is subjected in conveying even adds to its density and closer structure. The building department at Ratzeburg tested transported concrete for foundations and found it to be 15 per cent. superior to the concrete made at the construction plant. This concrete had been transported a distance of 5,000 ft. from the place of manufacture to the building where it was to be used, the conveyance being by industrial railway and conveyors.

Novel Features of Bridge Work in Alaska

The Construction of the Miles Glacier Bridge over the Copper River —The Extreme Conditions Encountered and Methods Employed

An interesting description of the construction of the Miles Glacier bridge in Alaska is given in recent editions of The Engineer (London) from which we abstract the following:

The caissons for the detached ice-breakers for piers Nos. 1 and 2 were designed with the idea of not sinking them over 20 ft. below the bed of the river. They were, therefore, not built as substantially as the caissons for the piers. The grillage was fastened together with screw bolts with nuts up, in order to remove it and have continuous concrete from the cutting edge to the top of the ice-breaker. The gravel and boulders excavated in sinking these caissons were dumped inside the cofferdams for weight in sinking. On September 26th the erection of the caisson for ice-breaker No. 1 was commenced. The water in the river had fallen to such an extent at this time that the bar on which piers Nos. 1 and 2 and the ice-breakers were situated was exposed. The weather conditions from this date until April 1, 1910, were very severe, the wind velocities ranging from 60 to 96 miles per hour for the greater part of the time, and during the period of high winds and consequent drifting snow the temperature was always low. It was therefore found necessary to build a windbreak on the up-river side of both ice-breakers to make it at all possible for men to be at work erecting and caulking the caissons and cofferdams. Even then there were many costly and exasperating interruptions by the windbreaks blowing down, necessitating a wait until the velocity of the wind became such that it was possible to put them up again. They were always re-erected under very trying and costly conditions.

On December 14th the caisson for ice-breaker No. 1 was completed and sinking began. On December 27th this caisson was landed and the sealing of the working chamber was commenced; it was completed on December 31st. The erection of the caisson for ice-breaker No. 2 was begun on November 14, 1909, and completed on January 6, 1910, when sinking was begun. This caisson was landed on February 3rd, and the concreting in the working chamber was completed on February 10th. The sides of these caissons were made vertical in order to simplify framing, and, owing to there being no batter on the walls, an excessive skin friction was developed. On No. 2, with a penetration of 19½ ft. in the gravel and boulders, it was impossible to force the cutting edge any further down, although there was a load on the caisson which exerted a downward pressure of 1410 lb. per square foot of the exposed sides of the caisson, and the excavations inside the working chamber reached 2½ ft. below the cutting edge. Ice-breaker caisson No. 1 was sunk 18 ft. below the surface of the bar. On February 14th the removal of the gravel and boulders used as ballast in sinking the caissons was begun, but owing to the severe weather conditions poor progress was made, and the last of the ballast and timber grillages were not removed until March 22nd, when an attempt was made to pump out the cofferdam of No. 1, but it was found impossible. Concrete to the depth of 5 ft. was then placed in the water by bottom dumping buckets, and on April 11th the cofferdam was successfully pumped out, the forms were built and concreting commenced on April 25th and completed on May 1st. The entire construction of these foundations was carried on night and day, and required two shifts of men in all capacities.

On January 3, 1910, falsework for the erection of span No. 1 was commenced. The ice on the river at this time was 7 ft. thick. Steam jets 1 in. in diameter were used to thaw four holes through the ice at the point where each pile was to be driven. It only required a few minutes to thaw the holes for a pile, when it was driven to the bottom of the river. Little or no penetration was expected, or secured, on account of the large boulders of which the river bottom was composed.

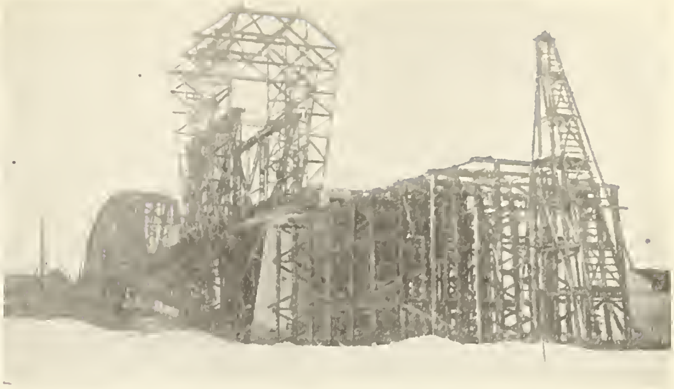
It had been expected that the steel for this bridge would reach the site in time to begin erection by the middle of March, but owing to delays in the shops and to snow blocks on the transcontinental roads, the steel for the first two spans did not reach Seattle until after this date. On March 15th was begun the erection of a three-bent traveller, which was designed to have sufficient clearance to erect span No. 3. On December 15th the weather turned warm and there were two weeks of heavy rain, the water flowing over the ice in the river to a depth of 4 ft.

Owing to this warm weather Childs Glacier began moving forward, contracting the channel and buckling the ice in the river half a mile below the bridge. When cold weather came again, on December 30th, the face of the glacier had advanced 400 ft. from its position in the latter part of August. The forward movement of the glacier stopped as soon as it became cold, but the channel had been contracted to such an extent by this forward movement and by the cakes of ice from

Sinking a Caisson

Caisson and Two Finished Piers

Cableways and Footbridge

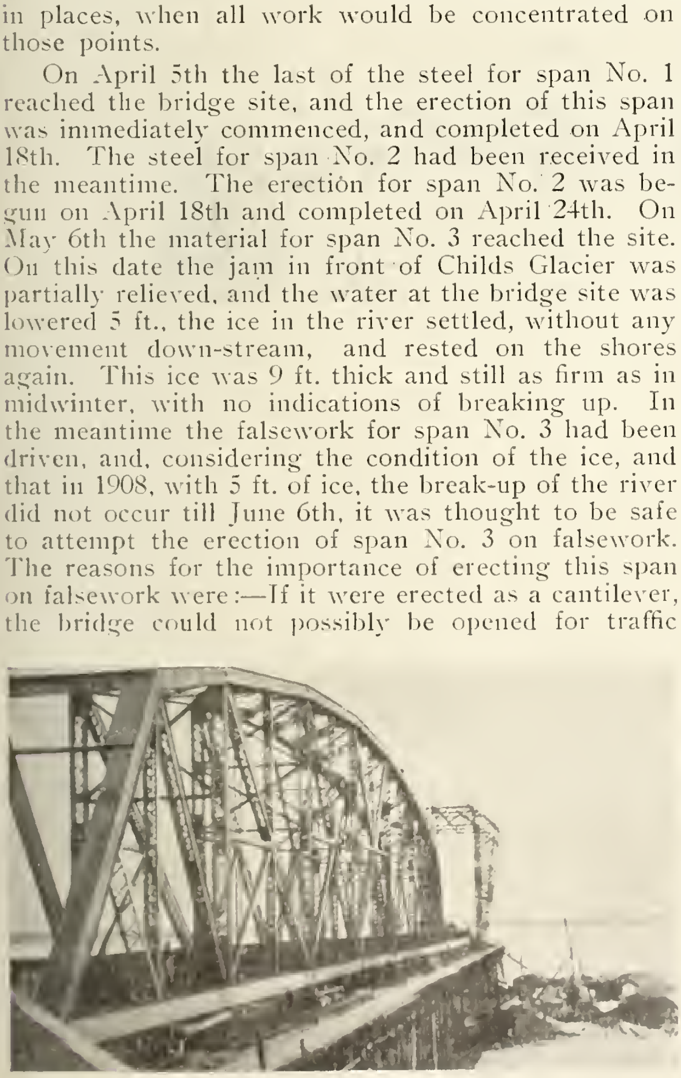


View of Staging and Erecting Gantry

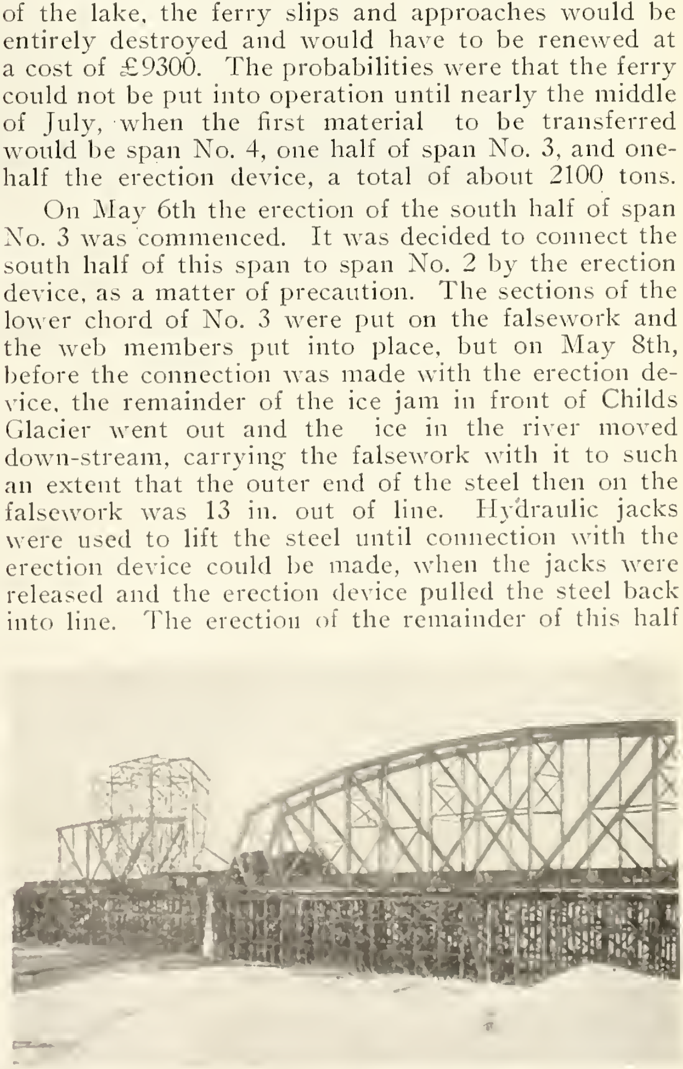
3 ft. to 5 ft. thick being turned upon edge and crowded together, that the water in the river rose gradually from April 1st, when the extreme cold weather was over, to May 6th, when the jam in front of the glacier partially broke and the water in the river began rising and lifting the ice and the falsework for spans Nos. 1 and 2. Men were kept on the ice below the falsework with steam jets and chisels, welded in the ends of 1-in. pipe, to clear the ice from the piling. A large force of men was required in this way night and day to prevent the ice from freezing to the piling and lifting the falsework as it rose. Even with the greatest watchfulness, the falsework would rise several inches in places, when all work would be concentrated on those points.

On April 5th the last of the steel for span No. 1 reached the bridge site, and the erection of this span was immediately commenced, and completed on April 18th. The steel for span No. 2 had been received in the meantime. The erection for span No. 2 was begun on April 18th and completed on April 24th. On May 6th the material for span No. 3 reached the site. On this date the jam in front of Childs Glacier was partially relieved, and the water at the bridge site was lowered 5 ft., the ice in the river settled, without any movement down-stream, and rested on the shores again. This ice was 9 ft. thick and still as firm as in midwinter, with no indications of breaking up. In the meantime the falsework for span No. 3 had been driven, and, considering the condition of the ice, and that in 1908, with 5 ft. of ice, the break-up of the river did not occur till June 6th, it was thought to be safe to attempt the erection of span No. 3 on falsework. The reasons for the importance of erecting this span on falsework were:—If it were erected as a cantilever, the bridge could not possibly be opened for traffic earlier than September, 1910, and all of the construction material and supplies for the remaining 100 miles of line to be laid would have to be transferred across Miles Glacier Lake by a small barge carrying two cars at a time. For a large percentage of the time there would be so many icebergs in the lake from Miles Glacier that navigation would be impossible. These icebergs would be continually damaging the ferry ships and approaches, necessitating constant renewals and frequent cessations of navigation. Taking these interruptions into consideration, the capacity of the ferry would not be sufficient to supply the necessary construction material. When the ice went out of the lake, the ferry slips and approaches would be entirely destroyed and would have to be renewed at a cost of £9300. The probabilities were that the ferry could not be put into operation until nearly the middle of July, when the first material to be transferred would be span No. 4, one half of span No. 3, and one-half the erection device, a total of about 2100 tons.

On May 6th the erection of the south half of span No. 3 was commenced. It was decided to connect the south half of this span to span No. 2 by the erection device, as a matter of precaution. The sections of the lower chord of No. 3 were put on the falsework and the web members put into place, but on May 8th, before the connection was made with the erection device, the remainder of the ice jam in front of Childs Glacier went out and the ice in the river moved down-stream, carrying the falsework with it to such an extent that the outer end of the steel then on the falsework was 13 in. out of line. Hydraulic jacks were used to lift the steel until connection with the erection device could be made, when the jacks were released and the erection device pulled the steel back into line. The erection of the remainder of this half



First Span of the Bridge Completed



Erecting the Second Span

of the span was completed without difficulty, after which a careful examination of the ice showed that it could not break up until it became ineffective. The jam in front of Childs Glacier was gone, but the channel ice above it was firm.

On May 11th the erection of the second half of the span was commenced, work beginning at 7 o'clock in the morning and continuing until 11 o'clock at night. On May 13th Miles Glacier began moving forward, crowding the four miles square of 9 ft. ice in the lake and the connected river ice forward. This was entirely unexpected, as in the springs of 1908 and 1909 there was no forward movement of the glacier until after the opening of the river. The movement down-stream on the 13th was only 2 in., but the velocity of this movement increased rapidly each succeeding day. The ice was so thick that saws were useless in cutting it, so all of the available men were put on the ice under the falsework, clearing the ice away from the up-stream sides of the piling with long ice chisels. Two shifts of thirty men each were kept at this work continuously, and succeeded in keeping the ice clear of the piling until about midnight of the 15th, when the movement of the glacier became so great that the ice gained on them slowly. Both shifts of men were kept working on the ice during the day and until midnight of the 16th. On May 13th a little over half of the second half of span No. 3 was in place, and it would have taken longer to remove this steel to a place of safety than to complete the erection. About 9 o'clock of the evening of the 14th two loading beams of the top of the traveller were broken by a lower chord section fouling when the lift was being made. By 8 o'clock of the morning of the 15th the loading beams were replaced, and the erection continued. From this time the same shift of men worked continuously on the erection until midnight of the 16th, when this span was connected and swung, and the traveller was moved over pier No. 3 on to the false work of span 4. By the middle of the forenoon of the 17th the up-stream side of the falsework had moved down-stream until it was directly beneath the down-stream truss of span No. 3, and a large portion of it had collapsed. The movement of the glacier had crowded ashore large areas of the lake ice by its forward movements.

The Miles Glacier Bridge upon Completion

The ice in the river broke up on May 23rd. Childs Glacier immediately became very active, and in a few weeks had broken back from the river until the face of the glacier was in the approximate position it had occupied for the last three years, and the river channel was free once more. The falsework of span No. 4 was completed, pony bents were erected on it, a track laid across, and daily trains were operated over the bridge beginning with June 1st. The erection of span No. 4 was commenced on June 10th, and completed on June 19th, without any noteworthy incidents. Marine tockolith was used for the first coat and R.I.W. waterproof for the second coat of paint. This combination had stood a test of one year's exposure better than any other of twenty varieties tested.

The following is a table giving particulars of various portions of the bridge:

Abutment No. 1	
Elevation of bottom of masonry...	112.00
Cubic yards of excavation	13,690.30
Cubic yards of concrete	2,691.60
Pier No. 1	
Elevation of cutting edge	81.40
Cubic yards of concrete	2,588.90
Skin friction just before landing caisson per square foot, lb.	620
Icebreaker No. 1	
Elevation of bottom of masonry	99.00
Cubic yards of concrete	1,240.10
Pier No. 2	
Elevation of cutting edge	81.95
Cubic yards of concrete	2,798.30
Skin friction just before landing caission per square foot, lb.	1,101
Icebreaker No. 2	
Elevation of bottom of masonry	99.00
Cubic yards of concrete	1,587.60
Pier No. 3	
Elevation of cutting edge	72.76
Cubic yards of concrete	2,927.60
Skin friction just before landing caission per square foot, lb.	617
Abutment No. 2	
Elevation of bottom of masonry	116.83
Cubic pards of excavation	9,794.70
Cubic yards of concrete	2,311.90
Total cubic yards of concrete	16,146.2
Weights of Steel	
Span No. 1	2,311,053
Span No. 2	1,568,553
Span No. 3	3,005,991
Erection device	530,349
Span No. 4	2,421,180
Total weight of steel	9,827,126

There is reported to be a movement in British Columbia, in parliamentary circles, to bar alien labor in the province. Especially is it proposed that only white labor be hired on railway construction in the province.

The Main Principles of Street Planning

Gridiron and Radial Plans—Former not Generally Adapted to Modern Conditions—Traffic Circulation and Control*

In dealing with this subject, it is necessary to classify the streets to be found into broad groups, according to their purpose, as the requirements of each kind differ in almost every way. This is usually done by dividing them into traffic and non-traffic streets, but, in most instances, such a division is too sweeping, and many different kinds of roads are thus lumped together quite unjustifiably, and no place is given to open spaces in either category. I would divide them into monumental open spaces, recreational open spaces, traffic places, markets, shopping and business places and streets, main through routes, main residential thoroughfares, secondary residential streets, main arteries of the manufacturing district, secondary manufacturing streets. This gives us as many as nine main divisions, but even then cases are constantly arising of streets which cannot be included under any of these heads, without straining a point, and, of course, in special cases, there will be other special classes, such as the cathedral town with its close, the shipping town with its wharves, and so on.

With the open spaces, considered as such and not as traffic centres, I propose now to examine some of the various attempts which have been made at orderly planning, and I think we shall find that the more the existence of these fundamental differences in the functions of different classes of streets and highways is recognized, the more successful is the plan.

The "Grid Iron" Plan

We begin, then, with the "Gridiron" plan, which is found in the remains of the Roman colonies; and even earlier than that, we have the earliest known effort at comprehensive planning in the ancient town of Kahun, as drawn and described by Professor Flinders Petrie, which is in this same gridiron system of planning, and again at New York, San Francisco, and many towns commenced during the last century, we have the same thing. In Bloomsbury, London, the same style of thing was done, and many other towns have been partly laid out in this manner.

That a style of planning so primitive and ancient is not well adapted to modern conditions we should be prepared to find, though it may sometimes be adopted for small areas with great success, especially if the architectural features bear strong evidences of a classical influence. Such a case is found in Edinburgh, where the district to the north of Princes St. is most successfully laid out on this principle, and it is much to be deplored that, when the coming of the railway upset the scheme, nothing was done to insure its replacement. Development ever since has gone on on the meanest lines.

The chief fault of the gridiron plan, from a practical point of view, is that it only allows of through traffic routes in two directions, and that traffic proceeding diagonally across the plan is compelled to take a zigzag course, which means much loss of time at every corner, not to mention the extra distance traversed. So greatly has this been felt in towns originally laid out on this principle that great efforts are now being made to superimpose diagonal lines into the original layout. Philadelphia is a very typical case.

Some cities have attained this combination of gridiron and diagonal lines by chance, or rather by the compelling force of circumstances, which is a strong point in its favor. Generally the diagonal lines have been evolved first and the square lines added afterwards, as at Calais, in France.

From the aesthetic point of view, the gridiron plan is also very undesirable, not only from its monotony, but also because it does not provide sites at the ends of long vistas whereon to place important buildings, and so the necessary perspective cannot be gained to view them properly. In many towns, too, where the streets are near together, this form of planning has resulted in there being no parcel land big enough for the use of an exceptionally large building, and so excessively and undesirably tall buildings result.

Even the superimposition of diagonal lines will not entirely do away with these defects, though, that very much may be accomplished is evident from the detail plan of the proposals for a parkway from City Hall to Fairmount Park, which forms part of the Philadelphia scheme. Nevertheless, these efforts all partake of the nature of patchwork improvement, showing that the principle is at fault, and should not be adopted for new cities.

The better way is found when we come to studv the traffic and other requirements to be faced. We then see that three-quarters of the traffic in every town proceeds to or from a point near the center and the suburbs or surrounding country. This means that three-quarters of our traffic streets should radiate from the center of the city to its boundaries, and further study will show that, in all ordinary cases, the remaining quarter of the traffic gyrated round that center so that, if we do the best for the traffic, we have a plan which follows the lines of the spider's web.

The Radial Plan

A further development of the radial plan is what is known as the "ringstrasse," as it has been more extensively adopted so far in Germany than elsewhere. It consists of a ring of parks round the central part of the city, and, in old cities, has usually been obtained by clearing away obsolete fortifications. Vienna gives the best example, where a very fine use has been made of the opportunity there afforded.

In a theoretical case, then, our plan will consist of a series of radial streets and another system encircling the point where all the others join. At the latter point will probably be placed a large open square or plazza, in the center of which may stand the chief building of the town, say, the cathedral, university, capitol or commercial exchange, according to whether it is an ecclesiastical, educational, administrative or commercial centre. We are, however, at once confronted with two difficulties, which are, that our radial streets will be too far separated in the outer parts of the town, and that so many streets, and consequently so much traffic crossing at one point, will create great congestion in the central square, which is highly undesirable round an important building or group of buildings of the nature suggested. Here the ringstrasse comes to our aid and provides not only trees, greenery, water and the songs of birds, within a moment's walk of the busy offices in the center of the city, but also the opportunity of providing interlacing roads, which are really short cuts, diverting all traffic from the central square, which is not destined for a point exactly on the opposite of it from that which it starts. It also provides for the arrangement of a series of secondary radial roads which do not proceed right into the center of the town and so are not traffic routes, but merely means of access, and do not proceed out into the country, and so leave large sites available for industrial purposes or for development as individual units for residential suburbs.

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* Abstracted from a lecture by Thomas H. Mawson, LandscapeArchitect, London, England, delivered at the University of Toronto.

Such a plan could never, of course, be carried out without adaptation to the needs and possibilities of an individual site, nor is it desirable that it should be, but the principle may always be used, and has been in many instances. It seems equally suited to a large town or a small suburb.

This indicates another way in which the radial system of planning surpasses the gridiron plan, that is in its adaptation to and recognition of the contours. Its adaptability to various conditions met with on the individual site, which are never the same on any two pieces of work, must necessarily be much greater than a collection of stiff straight lines crossing one another at right angles, and necessarily so near together that no deviation to meet the contours is possible.

In a number of instances the curved roads are not struck from a center, but deviate somewhat. This is for the purpose of meeting the contours, and, in fact, these lines were laid down on a carefully prepared contour plan, as all such work should be. The adaptation of the lines of roads to the contours in this way has both practical and aesthetic advantages. Not only does it allow of easier gradients, making traffic easier, but it also expressed, in a logical and straightforward way, the prevailing characteristics of the surrounding country, and, as no two sites are alike, provides infinite variety.

Lake-Side Cities and Seaports

The fan-shaped construction of this plan also brings up another point. Where the town is a port on the shore of a large river, or lake, or the sea, we have a variation in the traffic problems to be met, for not only will there be traffic radiating from and gyratory about the centre, but also traffic proceeding from the wharves and warehouses along the shore inland in all directions. The fan-shaped plan allows of this in a very simple manner, for the circular roads, at the water side, become a means of reaching the center of the town from every point where they touch it. This has evidently been realized by the city officials at Liverpool, who are at the present time constructing just such an avenue enclosing their city and most town plans of recent date for cities on a waterway, such as Mr. Burnham's plan of Chicago, recognize it.

The plan of Copenhagen is very interesting in this respect and shows that what was intended primarily as a gridiron plan has evolved these very characteristics from the force of circumstances in a manner particularly adapted to the site which is on a peninsula.

We have not yet exhausted all the advantages which the radial plan has over the gridiron, however, for it has the additional advantage of allowing of town gardens, squares, and open spaces, in the placing of which there is an obvious raison d'etre which is absent in the rectangularly planned town. In the latter, when you want an open space of any kind, you simply miss out one, two or three blocks of buildings, as the case may require, and the fact that this may be done anywhere at random gives the result the appearance of being the outcome of an arbitrary apportionment. In the radially planned town, however, there are numerous sites where roads divide, and so on, which call aloud for treatment as open spaces, and so, when this obvious need is fittingly met, we have a sense of fitness which adds greatly to the aesthetic effect. I need hardly add, too, that where two roads converge at either side of an open space, where drivers of traffic along one road can see that approaching the point of junction by the opposite road, there is much less danger of collision than where they meet suddenly round a corner in the square plan. In the radial plan, too, where they approach each other obliquely, the two streams of traffic unite or cross much more easily than where they cross one another at right angles.

Traffic Circulation and Control

This brings us to the important and, in some of its connections, very abstruse question, of traffic circulation and control. The most important traffic question of all relates to those points in the busiest parts of the town, where the traffic has a tendency to converge on one point and so create congestion and delay. The axiom one finds in books on town planning with regard to these places is that "The multiplication of traffic places should be avoided." Now, while I entirely agree with what the writers mean when they say this, I think it may be far better put by saying that, "The points where traffic crosses should be multiplied, so that a large number of streams do not converge at any one point."

One way of overcoming the inconvenience of a number of streams of traffic converging on, and recoiling from one point, which has been very much discussed of late, and which has attracted a very considerable attention, is what is known as the gyratory circulation of traffic. The principle is that, wherever the traffic enters the open space at the junction of the roads, it should all proceed round the space in one direction until it reaches the road leading away from the center which it wishes to traverse, when it would naturally and easily fall out of the stream. This idea would work most excellently for street cars on rails, but there would be considerable difficulty in persuading the average driver to go round three parts of the circle to reach the point he wants, when the fourth segment is so much shorter, and the more democratic the local sentiment, the greater the difficulty. Many devices are proposed for overcoming this defect, the most usual being to make the roadways approach the open space tangentially, so as to bring the traffic into it pointing in the direction in which it is proposed it should gyrate. Unfortunately this involves the slowing up of the traffic at the point where it leaves the traffic center in order to turn a sharp corner, thus neutralizing the chief advantages claimed for this system, and I have not yet seen a really successful attempt to overcome this difficulty. The aesthetic possibilities of the two systems are quite different. While there are numerous examples where the vistas down the four streets converge on one focal point in the center of the square, which, would, almost necessarily, be graced by a fine architectural feature, such as a clock tower or fountain, in other cases we have separate vistas not calling for such heroic treatment, but providing a fine opportunity for an extra bold treatment of the facade at the point where it comes across the view down the street.

There is yet another means of overcoming the dislocation of traffic, which occurs where two streams cross, and this is the superimposed thoroughfare, that is to say, by carrying one road over the other by bridge. We have done this in London by means of the Holborn Viaduct, and the plan has proved to be all that could be wished on the practical side, though one wishes that the bridge were more successful architecturally. Crescent roadways are provided to accommodate this traffic, and there is no valid reason, except expense, why these quadrants should not be adopted everywhere where two important traffic roads cross, whether they are superimposed or not.

Clayworkers' Convention at Toronto

Mr. D. A. Lochrie
President Canadian Clay Products Manufacturers' Association

The annual convention of the Canadian Clay Products Association is being held this week in Toronto at the Prince George Hotel. The sessions are scheduled for Wednesday, Thursday and Friday, February 14-16. The secretary of the Association is Mr. D. O. McKinnon, McKinnon Building, Toronto. The papers to be read cover a range of interesting subjects, including, Mining and Handling—Plant and Power—Drying — Burning — Organization—Selling Methods, etc. A discussion on tile advertising will be introduced by Mr. Geo. B. Drennan, of the J. D. Fate Company. Elaborate arrangements are being made by the entertainment committee, which consists of Messrs. Lochrie, Miller and Berg.

In the construction of the cellular portion of the upper approach wall at Gatun Locks, it was found impracticable to dump concrete directly from buckets into the 18-inch forms for the walls. The method adopted, according to the Canal Record, is to cap the inner forms for the rectangular cell with a pyramid of heavy boards. The concrete is dumped over the apex of the pyramid and flows down the sides in an approximately equal distribution among the forms at the base. Since all the concrete falls into the continuous space between two homologous rectangles, it can be packed evenly about the inner form without difficulty. At present the concrete is dumped from 2-cubic yard buckets by a stiff-legged derrick.

Short-Sighted Contractors

There is more real economy in having efficient office help than in trying to get along with men whose ability is moderately good. A contractor who is conscious of this fact is the man who makes progress. Sometimes a builder is desirous of making as much profit for himself as is possible on every contract that he takes, and one means to attain this end is the employment of inferior workmen. He labors under the impression that with his own assistance he can not only show them much that will be helpful. but that he can do a great deal himself and in this way keep the cost down.

For many reasons this is a most foolish notion. It might prove helpful sometimes in the case of a very ordinary piece of work, but even then the errors made, time lost and other annoyances really foot up more than the additional profit would be by employing the best help. There are some contractors, states the National Builder, who are so narrow in their views on this important question that they are short-sighted enough to feel they are actually making a nice profit when they are losing money.

There is also the question of cheap construction work. Some builders, particularly those who construct buildings to sell, have the habit of using only inferior materials and the most inferior labor. In order to hide the defects, which are natural in most cases, they hide them with paint and paper.

There is another class of house contractors who work upon lines that are slightly different from the above, but which are in no respects more honorable. They use scrap lumber, cheap brick and other materials that are worse than second hand, and they offer them as first-class houses, while some of the defects are actually in evidence. Many buyers are poor people, who have only a small cash payment to make, and the rest is purchased on time payments, with large interest. If he moves out, the contractor is just that much ahead. He sells it to another at the original price, sometimes for cash or on the same terms. In any event he is the gainer.

Instances of this kind are far more common than many would like to believe possible. What is the reputation of the builder of this class of work? He does not care, and no one else should. But there is the danger of mistrust that is shared by many other contractors who are honest. It is a grave error to use inferior materials, or to employ inferior help. The economy in this way is not only false, but it is a millstone to drag to ruin the unwise contractor. How often, in order to beat a competitor or to keep a force of men at work, or for some other reason equally as unwise, will not a contractor take a job at a figure that will make it almost impossible to obtain a profit?

Ignorance of the conditions governing a contract is sometimes responsible for this; then, on other occasions, it is ignorance on the part of the contractor himself as to the duties demanded of him. In either event it is well to leave it to some one else, and not take a chance that has so much of the gamble in it. It is these little points that are at times most valuable for the contractor to bear in mind. The wise contractor will see ahead of him, and not simply live from day to day, taking every possible opportunity that savors of chance, in order to seek and make an imaginary profit for himself.

Builders of the Western Metropolis

The Carter-Halls-Aldinger Company, Limited, Winnipeg, Man. —A Season's Contracts Worth $2,500,000—Features of the Work

A number of interesting contracts were carried out last year by the Carter-Halls-Aldinger Company, Limited, Winnipeg, the total value of whose work during the twelve months was two and a quarter million dollars. This may sound rather a large figure, but it must be remembered that this company operate in all of the principal cities from Fort William to Calgary and Edmonton. We give below photographs and brief descriptions of three notable contracts carried out by this firm in Winnipeg last year. A long list of important work still remains. Of the most noteworthy may be mentioned office buildings for the Trust & Loan Company and the Sterling Bank; warehouses for the Hudson's Bay Company, the Gowans Kent Company, the Winnipeg Fish Company and Richards & Brown, all in Winnipeg; the Administration Building and Power House of the Agricultural College, at St. Vital, Man., for the Provincial Government; at Saskatoon, warehouses for the J. H. Ashdown Hardware Company and Messrs. Campbell, Wilson & Adams, also the Dominion Bank and City Power House. The company also completed the foundations and part of the steel work for the Calgary stores of the Hudson's Bay Company.

Gowans-Kent Warehouse, Winnipeg

Trust and Loan Company's Building, Winnipeg

The Carter-Halls-Aldinger Company have carried out a considerable amount of work for the railways. Recent contracts for the Canadian Pacific Railway include the round house and shops at Westfort, Ont., similar buildings and a freight shed at Regina, and a machine shop at Edson, Alta. Last year witnessed the completion of the large warehouse at Yorkton, Sask., and Brandon, Man., of the International Harvester Company of America.

It will be seen that 1911 was an exceptional year with this enterprising firm. Satisfactory as things were, however, the company expect 1912 to be the largest building year, both in the history of western Canada and also in the annals of their own business.. In a recent communication to the Contract Record they expressed the opinion that the value of permits issued in Winnipeg this year would exceed twenty million dollars and that the cities of Calgary, Edmonton, Saskatoon, Regina, Fort William and Port Arthur would show corresponding increases—of all of which business the Carter-Halls-Aldinger Company naturally expect to get a share. They have now under construction a new office building for the Manitoba Free Press of Winnipeg and the new Exhibition Building for the city of Winnipeg. They also have a contract for the erection in Winnipeg of a ten-storey office building for the Confederation Life Association of Toronto (Mr. J. Wilson Gray, architect).

It goes without saying that so far as the details of labor and equipment are concerned the Carter-Halls-Aldinger Company have had wide experience in carrying out such work as we have enumerated above. They have their own complete staff and carry out the various trades with their own men and superintendents, with the exception of plumbing and heating, electric wiring and galvanized iron work. It is noteworthy that the company employ an efficient staff of engineers and architects so that they are in a position to furnish full details when necessary.

Gowans-Kent Warehouse, Winnipeg

This is a reinforced concrete building, 54 ft. x 160 ft., eight storeys high and basement. It is considered one of the most artistic warehouses in the city. The front is carried out in white glazed Doulton Terra Cotta, which is very pleasing. The floors, columns and lintels are reinforced concrete, the Turner System being used, and all floors above the second have a cement finish. Corrugated iron forms were used. This leaves a corrugated effect on the ceiling, which was later treated to a coat of white paint. Electric passenger and freight elevators are installed and there are marble floors and wainscoting in the corridors. The building was erected complete in seven months and cost $140,000. Messrs. James Chisholm & Son, of Winnipeg, were the architects.

Trust and Loan Company Building, Winnipeg

This is an office building, eight storeys and basement, with all modern improvements, including two electric elevators, marble corridors, mechanical ventilation, oak trim throughout, selected birch floors. The front elevation is very effective, and is carried out in white glazed Doulton terra cotta. The light walls are faced with white enamel brick. Mr. J. H. G. Russell, Winnipeg, was the superintendent of construction. The cost of the building was about $160,000.

Hudson's Bay Company Warehouse, Winnipeg

This is a reinforced concrete building, 100 ft. x 281 ft., three storeys and basement. The floors are supported by the brick exterior walls which are faced with Red Menomonie Sand Mould Brick and which laid to design are very effective. The Turner system of reinforced concrete was used for the floor slabs and columns. Each floor contains about eight hundred cubic yards of reinforced concrete and with its supporting columns and lintels over windows, was poured with one mixer, on an average of forty-four working hours, which was done in three days, working late each evening. Corrugated iron was used for the floor slab forms, which left the ceiling with a corrugated effect. The excavation was started June 15 and the building was partially occupied by the owners on November 1st. The date of completion was December 1. All the floors have a cement finish and the building is practically fireproof. The foundations were made strong enough to carry three additional storeys. Messrs. Woodman & Carey, of Winnipeg, were the architects and superintendents of construction. The total cost of the building was $150,000.

Winnipeg Warehouse of the Hudson's Bay Company

Saskatchewan Association of Architects

The Saskatchewan Association of Architects has been organized under an Act passed at the last session of the Legislature and a notice of the organization appears in the current issue of the Saskatchewan Gazette. The result of this will be that "after the expiration of six months it shall be unlawful for any person not holding a certificate of registration in Saskatchewan under the provisions of the above Act to advertise or put out any sign, card or other device for the purpose of indicating to the public that he is entitled to practise as an architect."

This will place the architectural profession on the same level with the professions of medicine and law, and should result in considerable benefit to the province. After six months all persons wishing to practise architecture will have to pass the different examinations as called for by the Act, but any person who was practising in Saskatchewan on March 23, 1911, may be registered under the Act within six months by paying the registration fee.

The first council has been appointed by the Lieutenant-Governor in Council as follows: President, Mr. F. Chapman Clemesha, Regina; 1st vice-president, Mr. W. W. La Chance, Saskatoon; 2nd vice-president, Mr. R. G. Bunyard, Moose Jaw; secretary-treasurer, Mr. W. G. Van Egmond, Regina. Committee: Professor A. R. Greig, Saskatoon; Mr. W. R. Reilly, Regina, and Mr. Norman L. Thompson, Saskatoon.

A meeting of the Council as above constituted was held in Regina on September 11, 1911, and By-laws, Code of Ethics and Competition Regulations were drawn up and adopted. The by-laws of the Association were approved by an Order-in-Council passed under date of January 15, 1912.

Notices have been sent out to all known architects in the province. All wishing to register under the provisions of the Act should make application to the secretary-treasurer, Mr. W. G. Van Egmond, P. O. Box 1344, Regina, Sask.

Alberta Architects' Convention

The Sixth Annual Convention of the Alberta Association of Architects was held recently at Calgary. A number of interesting papers were read. Among these may be mentioned "Mind and Materials," by Mr. G. G. Irvine, and one on "Town Planning," by Mr. L. M. Gotch. An excellent banquet was given at the King George Hotel on January 29. At this convention the chair was occupied by Mr. G. M. Lang, president of the Association. Ald. Brocklebank, acting mayor, replied to the toast of the city and dealt upon Calgary's rapid progress. He noted with satisfaction that the relations between the local contractors and architects had always been of a most friendly and cordial character. Mr. Brocklebank criticised the city for having the building work entrusted to the city engineer. He urged that in a city like Calgary, which spent over thirteen million dollars in building last year, a competent architect should be appointed. Addresses were also given by Messrs. J. W. Aldridge, C. Hay and A. H. Young.

Legal Decision re Street Levels

An interesting decision was given recently by Chief Justice Sir Melbourne Tait in the action brought by Matthew Sheridian against the city of Montreal. Plaintiff represented that some years ago he had purchased a lot of land fronting on Nicolet street, and subsequently deciding to build, he had secured levels at the City Hall. In accordance with these levels he constructed the foundation of his house five feet above what was then the street surface. In doing this he based himself on the height of the sewer manholes which had been placed in the street. Recently, however, the city authorities, in levelling Nicholet street, raised the street surface in front of plaintiff's premises some fifteen feet. The result was that plaintiff's house was practically buried, the surface being on a level with the tops of the doors and windows of the ground floor. Moreover, as the latter structure was situated some eleven feet back from the street line, the city workmen had placed earth and debris on this part of the land to the depth of some ten feet. Plaintiff sought to have the city forced to remove this earth, which constituted an obstruction of his premises and an unlawful occupation thereof.

The city, in its plea, maintained that, in accordance with the municipal by-law dealing with the question, plaintiff did not take adequate steps to ascertain the proper future level of the roadway in front of his premises and was consequently responsible for whatever damage had accrued to him.

The court ruled, however, that the city had not given legal notice as to its plans in regard to the raising of the roadway, and that thus, though plaintiff might have neglected to take all precautions necessary, the city was not thereby authorized to make use of his land in the manner described. Hence it was ordered that the earth and debris placed on the front part of plaintiff's lot should be removed at the expense of the city and that, moreover, the municipality should pay plaintiff damages to the extent of $100.

Canadian Railroad Development

The Buffalo & Fort Erie Ferry & Ry. Company (Mr. F. J. Weber, President), 730 Main street, Buffalo, N.Y., now operating four miles of steam line, has submitted a proposition to the Niagara, St. Catharines & Toronto Ry. Co. (electric), St. Catharines, Ont., in connection with the extending of the line from Port Colborne to Crystal Beach and Fort Erie Beach. The ferry company proposes building a new ferry terminal at Fort Erie Beach at an estimated cost of $300,000 and double-tracking the road from Fort Erie to and beyond the Beach and erecting new terminals. The Niagara, St. Catharines & Toronto Company would furnish the rolling stock and operate its cars over the ferry company's right-of-way, under a traffic arrangement.

In an interview in Montreal, Sir William Mackenzie, president of the C. N. R., stated that the company will shortly undertake the double-tracking of the line from Port Arthur to Winnipeg, and that the work on the new station at Calgary will be started this spring. Altogether the company will spend $25,000,000 in extensions and betterments west of the Great Lakes this year, and employ 20,000 men in construction work.

The contract for the proposed Grand Trunk Pacific Hotel at Edmonton is about to be let. The structure will contain 150 rooms, and the cost is estimated at $750,000. A similar building is planned for Regina. It is stated that these and the other hotels on the system will be ready for the opening of the G. T. P. in 1914.

The Canadian Pacific Railway Company have just awarded to John S. Metcalf Company, Limited, Montreal and Chicago, a contract for a reinforced concrete storage addition to their elevator at Port McNicholl, Ont. The capacity of the additional storage will be 2,000,000 bushels. The estimated cost, together with the additions to the wharf work to enable the travelling marine towers to reach the new storage, is approximately $350,000. The new work is an addition to the 2,000,000 bushel elevator completed by the above company for the Canadian Pacific Railway at Port McNicholl rather more than a year ago.

C.P.R.'s Big Western Programme

Some further details are now available regarding the construction work to be done this year by the Canadian Pacific in the Western Provinces. Work will be carried on actively this year on the line from Swift Current, northwest which was begun last year. On this branch 85 miles will be built during 1912, thus carrying the terminus to a point very close to the junction of the Red Deer River with the South Saskatchewan. It is now stated that the line will cross the South Saskatchewan close to the point of junction with the Red Deer river, and that it will then be carried a distance of 150 miles to Coronation, a terminal point on the road running from Lacombe to Kerrobert. From Coronation, a terminal line will be built northwest to Sedgwick, a point on the present main line from Edmonton to Winnipeg. There will also be a line from Coronation to Camrose, from which point it is the intention of the C. P. R. to build a direct line into Edmonton. The construction of these various lines will give the Canadian Pacific a direct through line from Edmonton to Swift Current. From Swift Current the company is building a new line southeast, on which much work was done last year, and on which work will be continued this year. This road will be continued until it meets a line running southwest from Moose Jaw, south of Lake Johnston. When the junction is effected a connection will be made between this new line and the line running from Weyburn to Lethbridge. This will give through communication from Swift Current to Weyburn, from which terminal point there is a through line to Portal and hence to St. Paul and Minneapolis.

Advices from Montreal state that preparations have been completed for the building of the Central Railway of Canada. The first section from Montreal to Ottawa will be completed by the end of the present year, while the further portion, from Ottawa to the Georgian Bay, will be built shortly after. The company has changed its original plan, and the route, instead of passing through St. Benoit, will follow along the shore of the Lake to Two Mountains, passing through St. Placid and Oka, crossing from the mainland to Ile Jesu at St. Eustache, and reaching the Island of Montreal at Cartierville. It will then parallel the Riviere des Prairies, crossing the Canadian Pacific tracks at Jacques Cartier Junction and reaching the Harbor Commissioners' line on the waterfront at Tarte Pier. This will be the first freight entrance into Montreal. A passenger entrance is planned from the west, and it is expected that the terminus will be the Grand Trunk Railway's Bonaventure Station.

Surveys are being completed and it is expected that within a month or so bids will be asked for the extension of the Temiskaming & Northern Ontario Ry., into the Elk Lake District. No announcement has been made as yet regarding the route of the new line, but it is considered probable that it will branch off from the main line near Earlton, following the general direction of the present wagon road. The final choice lies between this route and the Charlton one. The latter has been surveyed and would involve considerably less outlay, the Charlton extension from Englehart being closer to Elk City than Earlton. The Earlton route, however, would be somewhat more direct for traffic between Toronto and the Elk Lake camp. Mr. S. B. Clement, North Bay, Ont., is Chief Engineer.

Now that the Minister of Railways has finally decided to authorize Mr. J. D. McArthur of Winnipeg, Man., to go ahead with his contract to build 185 miles of the Hudson Bay R. R. from The Pass to Split Lake, plans are being perfected to furnish the road with valuable feeders. The Canadian Northern proposes to build from Prince Albert east, through the country north of the Saskatchewan to join the Hudson Bay road at Split Lake; and also to extend its Winnipeg-Oak Point branch northward between the lakes to a junction with the main line, giving Winnipeg a more direct road to the Bay. The McArthur contract was let last summer, and work was ordered stopped on Oct. 11. There were four bidders on the work, but that of W. A. Deller, of New York, was ruled out as being irregular. The other three tenderers were J. D. McArthur, of Winnipeg, at $3,078,354.50, for the section from The Pass to Thicket portage; Mann & Mackenzie, of Winnipeg, at $3,080,109.25; and M. J. O'Brien, of Renfrew, at $3,368,337.

Authoritative testimony as to the character of the work done by the National Transcontinental Railway Commission, was delivered by the chairman of that body, Mr. R. J. Leonard, at the annual banquet of the Brantford Board of Trade, held recently, where he was the guest of honor. With reference to the construction work in progress on the Winnipeg-Moncton section, Major Leonard announced that a further expenditure of $112,000,000 would be unavoidable. With few exceptions, all of the 1,805 miles were under construction, and there were between four and five hundred miles of track still to be laid. He hoped that, by the end of next autumn the line between Winnipeg and Cochrane would be completed, and, by the ensuing season, the whole line with the exception of the Quebec bridge, that would require an additional outlay of twelve million dollars. Major Leonard also referred to the four hundred miles of clay belt in Ontario, whose fertility was equal to anything on the prairies, and which would be so much nearer the sea by rail as to greatly enhance the value of Ontario lands.

The Grand Trunk Pacific has announced that its Winnipeg yards will be located at Springfield, where a start has been made, and sufficient acreage has been secured by the company for further extension for all needs for some time to come. It is the intention of the company that all freight trains run right through Winnipeg to Springfield where the yards are located. For this reason and in order to avoid congestion, which is feared may result from the running of freight trains through the city it is now proposed to build a loop line across from the west where the main line enters the city over the Red River through St. Boniface direct to the yards in Springfield.

Plans are under consideration by the Mackenzie-Mann interests for an extension of the Canadian Northern to the Pacific coast across the Peace River district and the Columbia River, through the Northern Rockies. This extension will run from Edmonton or Athabasca Landing and eventually terminate at Stewart on the Portland C. N. R. branch in British Columbia.

Montreal Harbor Improvements

Further details of the proposed improvements to Montreal harbor are announceed. The programme includes the lengthening of the Alexandra and King Edward piers to 1,200 feet and Jacques Cartier to 1,100 feet, in order to accommodate the larger boats which are certain to come to the port. A pier, to be known as No. 1, is to be erected near the entrance to the Lachine Canal, and, in addition, two lift bridges, with railway and roadway accommodation, are to be built across the basin to the Guard Pier, where 1,600 feet of new wharf is to be constructed.

The entire programme for the coming summer is as follows:

The construction of islets or anchorage tanks in the Laprairie Basin, to hold the ice until melted in the spring.

The construction of grain elevator No. 2, and jetty at Section 12, with conveyors reaching adjacent piers.

The improvement and extension of the harbor railway tracks from Victoria Pier to the Racine Wharf above winter water level, so as to be useful both summer and winter.

Completion of Victoria Pier and Market Basin giving 2,700 lineal feet of high level quays for ocean steamers, with a depth of 35 feet at low water, and 4,000 lineal feet of low level quays for river vessels.

The erection of permanent sheds on the new Victoria high level quays, including equipment.

The lengthening of the Alexandra and King Edward Piers to about 1,200 feet each, and of the Jacques Cartier Pier to 1,100 feet, and a corresponding lengthening of the sheds upon them.

The construction of high level shore wharves from the lower end of the new Market Basin, section 23, to Section 30, of a length of 3,600 feet, with a depth of 35 feet at low water.

The erection of permanent sheds with equipment on the new high level wharves, section 23 to 30.

The construction of a Grain Elevator No. 3, on section 30, having a capacity of 1,000,000 bushels and so located as to permit of liberal enlargement of the storage capacity when needed.

The construction of new Pier No. 1, above the Alexandra Pier, the extension of the Bickerdike Pier, the construction of 1,600 lineal feet of wharf along the Guard Pier with necessary alterations of two lift bridges to give direct railway and roadway communication between the main shore wharves and those on the Bickerdike and Guard Piers.

The erection of permanent sheds with equipment, and conveyors from the Grand Trunk Railway elevator, on New Pier No. 1.

The construction of high level shore wharves, Section 30 to Section 35, 3,000 feet in length and 350 feet average breadth and 35 feet depth at low water.

The construction of permanent sheds, with equipment, on the wharves, Section 30 to 35.

Dredging and filling, in general, including dredging for wharf foundations, for widening the channel opposite St. Helen's Island and Ile Ronde; altering the lower end of the Guard Pier; widening and deepening the harbor inside the Guard Pier, and deepening the channel between St. Helen's Island and the south shore, to lessen the St. Mary's current and obtain the necessary material for the construction of the piers and wharfs.

Paving and laying railway track upon all the new wharves.

Mr. F. L. Wanklyn, C.E., a member of the Montreal Board of Control, has resigned, after a service of two years. He is giving up for the reasons that he does not like the continuous strain and confinement incidental to the work, and that he is able to earn a much larger salary in a private capacity. Mr. Wanklyn had decided to resign at the end of last year, but held over its announcement until the recent aldermanic elections were over. By profession Mr. Wanklyn is a mining and railway engineer. Some years ago he was manager of the Montreal Street Railway. He is a member of the Canadian Society of Civil Engineers and was on the Council of that body in 1909. Mr. Wanklyn received several offers from corporations during the last two years, but refused them. Now, however, it is stated that he has definitely accepted a position with the C.P.R. The names of Messrs. Duncan McDonald, manager of the Montreal Street Railway; Mr. J. P. Mullarkey, railway contractor; Major Stuart Howard, superintendent of the City Sewer Department, and Mr. Percival W. St. George, ex-city engineer, and at present consulting engineer, are mentioned in connection with the vacancy. Mr. Wanklyn will not give up his position until March.

Some interesting and additional information relative to the Turner Mushroom System is contained in Bulletin No. 12 just issued by Mr. C. A. P. Turner, of Minneapolis and Winnipeg. The bulletin is copiously illustrated with typical examples of building work in various Canadian and United States cities. It is a sufficient recommendation for this system that with all the work executed in this new and novel type of construction there has not been a single case of collapse or failure. The wide distribution of the work carried out under this system may be judged from the illustrations in the pamphlet. These show buildings scattered from Portland, Me., in the east, to Portland, Ore., in the west, and from the cities of Winnipeg and Regina in the north to Melbourne, Australia, in the south.

NEXT WEEK The Sixth Annual Convention of the Canadian National Association of Builders. Toronto, Feb. 20-22, 1912

Personal News and Notes

Mr. Meyer J. Sturm, of Chicago, has been appointed consulting architect on the new hospital at Saskatoon.

The Bungalow Construction Company, Limited, Victoria, has obtained a charter with a capital of $150,000.

The value of the building permits issued at Moose Jaw, Sask., last year was $2,431,736, compared with $1,071,090 for 1910.

The permits issued at Calgary last month represented a value of $381,384—an increase of 30 per cent. over the total for January, 1911.

Messrs. Bresemann & Durfee, architects, of Victoria and Seattle, will open an office at 617 Holden Building, Vancouver, in charge of Mr. A. C. Semrow.

Mr. W. J. Francis, consulting engineer, of Montreal, will address the Montreal Builders' Exchange on Wednesday, February 21, on "Building and Building By-laws."

We learn that the city of Belleville, Ont., is about to secure a large automobile factory which will employ 400 hands. The outlook for 1912 is excellent for this progressive city.

Negotiations are being carried on between the G. T. P. and the British Government which it is hoped will result in Kink George's visiting Canada in 1914 for the opening of the Transcontinental.

Mr. Charles Brandeis, C.E., of Montreal, has been appointed consulting engineer to the Saraguay Electric & Water Company in place of his previous appointment as chief engineer. His large professional practice necessitated the change.

Approximately $5,000,000 will be spent by the Canadian Pacific Railway Company during the present year for improvements and new construction work on its main line and branches west of Field, the easterly boundary of the British Columbia division.

Mr. A. G. Rolston, of 1 Herman avenue, Toronto, has been appointed Ontario representative for the Goodyear Lumber Company, Buffalo, N.Y., extensive manufacturers of long leaf and short leaf yellow pine, also of Mexican sugar and white pine.

A strong protest has been made against a by-law forbidding the erection of shops on certain parts of Sherbrooke street, Montreal. It is declared that it will mean the loss of hundreds of thousands of dollars in real estate and has checked some important building schemes.

Mr. C. W. Power, resident engineer of the G. T. P., has been appointed engineer of railways, bridges and docks at Toronto under City Engineer Rust. The commencing salary is $2,400 a year, rising to $3,000. Mr. Power succeeded Mr. E. L. Cousins who was recently appointed harbor engineer.

Prizes of $1,000, $800 and $500 are to be given in order of merit for the three best designs submitted in competition for the proposed Technical School at Toronto. The assessors are Mr. Percy E. Nobbs, of Montreal; Mr. A. Frank Wickson, Toronto; and Professor McKay, principal of the school.

A busy building year is anticipated at Edmonton. It is estimated that the total for 1912 will run into anything from ten to twelve million dollars. Already plans are under way for the erection of buildings to cost one million dollars. One of the largest building projects at the present time is an apartment block for Messrs. McDougall & Forester, estimated to cost $250,000.

Mr. A. Butze, who recently retired from the position of purchasing agent of the G. T. R. system, was entertained at dinner on Wednesday, January 24, at Montreal. Many of the chief officials of the system were present, many of whom had been associated with Mr. Butze during his railway career. During the evening the guest of honor was presented with a loving cup.

Early next spring the Bell Telephone Company of Canada will build a new exchange and office building in Hamilton to replace the present one on Hughson street. The building will be on Main street, adjoining the Hamilton Club, and will have about 80 feet frontage, with about 137 feet depth. It will be of three or four storeys, the Main street facade being of pressed brick and stone.

The Urschel-Bates Valve Bag Company, of Toledo, have purchased the Old Milling Company's property in Niagara Falls South, Ont., and are making extensive alterations to the property, which must be ready for occupancy by them in a week or so. The company have a contract from the Canadian Cement Company for 1,500,000 bags to be delivered early in March. The Owen Sound Iron Works have a contract from the Urschel-Bates Company for the delivery of sixteen filling machines.

The city of Belleville, Ont., will probably be asked to grant a franchise to various interests concerned with a project to run an electric railway through Belleville connecting with Picton, Trenton and other roads. It is believed that the proposed road, which would tap a very rich country and populous district, would pay from the start. The City Engineer, Mr. J. G. Lindsay, is one of the directors of a company which has already obtained a charter for the operation of the road through Belleville.

Commencing on Tuesday, Feb. 13th, Professor Brown will give, in the Engineering Building, McGill University, Montreal, a course of eight lectures on reinforced concrete, with two laboratory demonstrations. The fundamental principles of design will be developed and applied. It is believed that there is a sufficient number of engineers, architects and others with an elementary knowledge of the subject to become interested in the subject. Prof. Brown is an authority on the scientific side of reinforced concrete, and has contributed some valuable papers on the subject. The fee for the course is $5.

Messrs. Beardmore & Company, of Acton West, Ont., have placed an order with Geo. H. Tod, of Toronto, for a pressed steel tank with a capacity of 30,000 gallons. This tank, which will be the first of its kind to be erected in Canada, will consist of 81 plates and will be 28 ft. long x 12 ft. wide x 12 ft. high. These patent pressed steel tanks are made by Thos. Piggott & Company, of Birmingham. For many purposes they have several advantages over rivetted tanks, the principal being their cheapness, lightness, strength and simplicity. Skilled labor is not required in erection, every part being to standard.

Mr. Arthur Chamberlain, secretary of the Calgary Builders' Exchange, was a welcome visitor at the offices of the Contract Record last week. Mr. Chamberlain is an English quantity surveyor, but he is properly enthused with the western spirit and nothing that he can say is too good for Calgary. He contends that an expenditure of thirteen millions for a city with a population of some sixty thousand shows progress that is in a class by itself. The Calgary Builders' Exchange is sending a good representation to the forthcoming convention of the C. N. A. B. and the delegates will probably put up a strong fight for next year's convention.

The Quebec Government has introduced the Metropolitan Parks Bill, which proposes the appointment of a permanent parks commission for the Island of Montreal and immediate district. In addition to acquiring property for laying out parks, squares, boulevards and streets, the commission would have power to examine into the conditions of dwellings of the working classes and to make recommendations to the government. Other powers include the administration of by-laws to control the exercise of any public franchise on the commission's properties, to prohibit the construction of poles and overhead wires, and to order the latter to be placed in underground conduits

"Good Roads" Progress

Some two hundred and fifty delegates from all parts of the province, including a civic deputation from Toronto, waited upon the Premier at Ottawa last week with a view to emphasizing the necessity for federal aid in the construction and maintenance of good roads in the provinces. Among the speakers was Mr. G. A. Simard, of Montreal, who stated that the province of Quebec was about to introduce a bill to provide for the expenditure of $10,000,000 in that province. Premier Borden expressed his great pleasure at meeting so representative a delegation, and assured them that nobody appreciated the importance of good roads more than he did. The Premier added that it was a difficult problem to define just what the Dominion Government could do. It certainly could not enter on a policy of maintaining provincial roads, but it would co-operate with the various provinces in any movement which would aid in the improvement of the highways, just as it proposed to co-operate with the provinces in aiding agriculture.

Ontario Highways Engineer Honored

Mr. W. A. McLean
Provincial Engineer of Highways for Ontario

Mr. W. A. McLean, Provincial Engineer of Highways for Ontario, has been elected Third Vice-President of the American Road Builders' Association. The election took place at the recent annual meeting of the Association in New York City. Mr. Nelson P. Lewis, Chief Engineer of the Board of Estimate and Apportionment, New York City, is President of the Association.

Representative Borland of Missouri has introduced a bill in the House of Representatives providing for a 60-ft. national highway from Washington, D.C., to Olympia, Wash., and one from Washington to San Francisco. The cost of the proposed roads is to be equally divided between the federal and state governments and each state is to stand a proportionate share of the cost of construction. The name of the highway is to be the National Old Trail Road, and it proposes to embrace the Braddock road, Cumberland road, national pike, Boom and Lick road, Kearney's road, the Santa Fe trail, the Oregon trail and other famous highways of the early pioneer days. This highway will then join the proposed Pacific highway to run from California to British Columbia so that a veritable triangle will be formed.

Contractors interested in cement sidewalk construction should procure a copy of the 1912 catalogue of T. Slack & Company, 145 Brock avenue, Toronto. This firm are the largest manufacturers of cement sidewalk tools in Canada. The new catalogue shows a complete line of tools, and contains, in addition, some interesting articles on sidewalk construction.

Obituary

Mr. E. Kavanagh, a member of the firm of Sanderson & Kavanagh, plumbers, died on Jan. 19 at his home in Montreal. Mr. Kavanagh was instructor at the plumbing classes held at the technical school, Monument National, Montreal.

Mr. James M. Fotheringham, district engineer of the Grand Trunk Pacific Railway, died in Quebec on February 6th. He had been a resident of the city since 1908. The remains were transferred to Windsor, Ont., his native town, for burial.

The Late Dr. Bovey

Professor Henry Taylor Bovey, F.R.S., D.C.L., M.A., who for more than twenty years was Dean of the Faculty of Science at McGill University, a position he resigned in 1908 to become rector of the Imperial College of Science and Technology, London, died recently at Eastbourne, Eng. Dr. Bovey was born in Devonshire, England, in 1852. After a distinguished college career, he decided to become a civil engineer, and joined the staff of the Mersey Docks and Harbor Works, and was in a short time appointed assistant engineer, a capacity in which he had charge of some of the most important structures then in progress. In 1887 he came to Canada on his appointment as Professor of Civil Engineering and Applied Mechanics at McGill University. At that time the engineering courses in the University were managed as a branch of the Faculty of Arts and were without buildings or equipment. In the following year, however, a department of Applied Science was constituted with Professor Bovey as its dean. He was one of the founders of the Canadian Society of Civil Engineers, and held the offices of honorary secretary, treasurer, and member of the council for many years. He was vice-president 1896-7 and president in 1900. He was also a member of the Institute of Civil Engineers—of which he was likewise one of the founders—an honorary member of the National Electric Light Association—in which society he was president of Section III., 1896—vice-president of the mechanical section of the British Association, 1897; a Fellow of the Royal Society, 1902, and an honorary Fellow of Queen's College, Cambridge, 1906. He also received the degree of D.C.L. from Bishop's College, Lennoxville, as well as that of L.L.D. from McGill and Queen's universities.

Dr. Bovey's publications, many of which are regarded as standard works, include the following: "Applied Mechanics," 1882; "Theory of Structures and Strength of Materials," 1893, 6th edition, 1905, and "Hydraulics," 1895, 5th and 6th editions, 1904, in addition to numerous papers for various scientific societies.

The late Dr. Bovey was a man of great energy, and it was due to his untiring efforts that the applied science department at McGill University has attained its present position.

Clinker Concrete as a Kiln Lining

An abstract of an article on the above subject taken from a German paper appears in the Journal of the Society of Chemical Industry, London. It states that the author has found that pure cement concrete possesses many advantages over other materials which have been used as linings for cement kilns. It has only to resist the mechanical wear and tear of the sintered cement mass which exerts no chemical effect upon it. The concrete is composed of 2 or 3 parts by weight of hard burnt cement clinker (the size of grain being from 2 to 20 mm.) and 1 or 2 parts by weight of ground slow-setting cement, and is mixed with just enough water to cause the mass to cohere when pressed together. When such freshly-prepared concrete is heated to a red or white heat, it hardens quickly, remains hard at high temperatures, and retains its form and hardness, whether heated slowly or quickly, in the sintering zone of a Dietzsch kiln in full work. The concrete begins to set in about an hour, and only about as much as can be used in that time is prepared at once. The concrete lining 20 cm. thick can be conveniently rammed into the whole length of a rotary kiln, by using an iron ring about 40 cm. smaller than the diameter of the kiln as a mold. A rim of concrete about 2-5 m. wide can be formed in a day, and left to set over night; the next morning the molding ring is moved and a second rim of concrete rammed against the first. No special care is required in heating the kiln to its full working condition. The examination of a layer of cement concrete only 10 cm. thick, which was tried in the sintering zone of a rotary kiln for 14 days, and then cooled, showed that a thin layer of cement had formed on the concrete and split away again on cooling, and the mechanical wear and tear amounted to 3 cm.; otherwise the concrete was intact. As the molten basic cement does not act chemically on the concrete, it does not adhere as it does to a fireclay lining, except for the cohesive effect of the ash contained in the coal. A cement concrete lining will last from 3 to 6 months in the sintering zone of a kiln, and is also suitable for the end shoot, which can be re-lined with concrete in an hour without interrupting the work, whereas re-lining with fireclay necessitates stopping and cooling the kiln. The concrete answers well not only with rotary kilns but also with other types, such as the Deitzsch, and Schneider. The lining can also be composed of blocks of concrete, kept ready for use, and mortared in with cement. The cost of repairing the concrete linings is much less than that of fireclay lining, being only about 12 to 14 m. per metre (84 cts. to $1.00 per foot), against about 230 m. per metre ($16.28 per foot) for fireclay lining, and as the former lasts longer than the latter, the repairs are less frequent. In actual practice, the cost of repairing the fireclay lining of a Deitzsch kiln amounted 5 Pf., and of a Schneider kiln to 2-5 Pf. per barrel of cement of 170 kilos. (1.2 cts. and 0.6 cts., respectively, per barrel of 374 lb.), whereas, for these kilns the repairs of a cement lining amounted to 0.7 and 0.8 Pf. (1.6 cts. and 1.8 cts.), respectively. The process is patented in Germany and other countries, and has already been adopted in 26 works.

The original painting, "The Noon Hour," was exhibited with distinction at the Royal Academy of London in 1909. It was painted by Mr. Charles Simpson and deals with the elemental theme of human labor close to the soil. Its subject is a typical entry to an English cornfield and depicts the teamster, with his horses, in a shady retreat about to take the usual noon-day rest. This painting is reproduced in an attractive calendar prepared for the Warren Bituminous Paving Company of Ontario, Limited, 103 Bay street, Toronto. The calendar contains a table showing the extent to which bitulithic pavements were laid in Canada during 1911. Toronto heads the list with 427.161 square yards, and the total is 1,429,515 square yards. This information would not appeal very strongly, perhaps, to the painter of "The Noon Hour," but it should make the calendar of additional interest to many readers of the Contract Record and Engineering Review.

Toncan Metal Culverts

A good deal of attention has been called lately to "Toncan Metal," the remarkable metal from which Pedlar Culverts are made. According to the manufacturers, "Toncan Metal" is made by the open hearth process and with all impurities carefully burnt out. This includes the elimination of carbon, sulphur and phosphorus, the general impurities in iron. In the ordinary state, iron is easily corroded, because it is impure and homogeneous. Spots in any given portion of ordinary iron will vary mechanically from small spots in adjacent portions, some being electro-negative and some electro-positive, whether these spots are an alloy or merely mixed in impurity. The presence of carbonic acid and oxygen, coal smoke, laden with sulphur, etc., immediately starts electrical action, with the formation of a dark red rust, scaling and pitting, until the iron is entirely self-corroded. It is impossible to prepare ordinary iron without this varying character of metal, and ordinary iron, if unprotected, will corrode, not from oxidation, but from electrolysis.

"Toncan Metal," of which Pedlar Culverts are made, is homogeneous, all parts being of the same chemical character. Therefore, there being no chemical variation, there is no production of electrolytic currents, as no spot is electro-positive or electro-negative, compared with any other spot on the surface.

In addition, for all practical purposes, "Toncan" is pure iron. It possesses ductility, malleability, high-corrosion resistant. These are characteristics of pure iron, identified by long service under weather exposure. Pure iron also resists sulphuric acid corrosion tests to a wonderful extent, compared with impure iron test-pieces of the same area and weight.

Not only are Pedlar Culverts made from "Toncan Metal," however, but the sheets are also covered with a heavy covering of spelter. It is claimed for Pedlar "Toncan Metal" Culverts that they do not pit, scale, corrode or fail from electrolytic action.

In tests of "Toncan Metal" it has been shown to be 99.94 pure iron product, and in corrosion tests along with the best open hearth commercial sheet iron, and with commercial sheet iron, the disintegration is proved to be practically nil.

The use of Pedlar "Toncan Metal" Rivetted Culverts, represents construction with minimum installment cost. minimum maintenance charges and the lowest fixed charges against operation of a railway. This includes such items as track maintenance and rolling stock repairs, which are intimately connected with the elastic character of the road bed, and it is protected against undermining and frost—a statement which is borne out by the increasing adoption of "Toncan Metal" Culverts for railroad use.

To railroad engineers and others who are interested, The Pedlar People, Limited, will send free on request their catalogue No. 600, together with approved set of specifications adopted by the Canadian railroad engineers.

One of the largest engineering firms in Birmingham, Eng., wishes to get into communication with the chief engineering importers in Canada. Particulars may be obtained by communicating with the Enquiries Branch of the Department of Trade and Commerce at Ottawa, quoting reference number 118.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Arthur, Ont.

John Kennedy, Smith street, is contemplating the installation of a gasoline pumping plant to supply water to residence from drilled well—wind-mill, gasoline engine or compressor tank.—house already fitted with pipes.

Calgary, Alta.

Tenders are called for sluice gates for Canadian Pacific Railway Company. Chief Eng., C. P. R. Irrigation Dept., A S. Dawson, Calgary. 4 sets of gates and machinery aggregating about 88,200 lbs. 3 sets of gates and machinery aggregating about 45,120 lbs. 3 sets of gates and machinery aggregating about 61,530 lbs. 2 sets of gates and machinery aggregating about 33,780 lbs. Tenders addressed to Chief Engineer received until noon, Feb. 29th.

Chilliwack, B.C.

Mayor, Waddington. City Engineer T J. Croly has been instructed to take necessary levels and estimates for sewage scheme. Mayor is negotiating with Elk Creek Water Co. Ltd re purchase of their plant.

Edmonds, B.C.

Tenders are called until March 11 for supply of about thirty-five miles of steel pipe, varying in size from 3 to 10 inches. Municipality of Burnaby; Clerk, W. Griffiths, Edmonds. Engineers, Cleveland & Cameron, 506 Winch Bldg., Vancouver.

Glencoe, Ont.

The council is considering expenditure of $3,000 on Main street. County Engineer, Mr. Talbot, London.

Orillia, Ont.

Town Engineer Greenwood has been instructed to prepare plans and estimates for extension of intake further into the lake.

Ottawa, Ont.

Plans will be prepared for sand filtration plant to cost $1,000,000 on Lemieux Island. City Engineer, N. J. Ker. Steps to be taken to have island deeded to the city by Dominion Government and included in city limits. In addition to plant consisting of 6 concrete filter beds a concrete storage reservoir will be built.

Tenders are called until Feb. 15th for outlet pipe, west end drainage. Supply of about 2500 ft. of 30-in. steel pipe and laying of same. Specifications at City Engineer's office. City Engineer, N. J. Ker.

City Engineer N. J. Ker has recommended to Waterworks Commission the installation of two more reserve pumps at Pump House. s are used at present.

Stratford, Ont.

The Board of Works has recommended that sidewalks and pavements costing about $25,000 be laid. Ald. Keller and City Engineer have the matter in hand and will see about calling for tenders shortly.

Toronto, Ont.

Tenders are open until Feb. 27th for construction of Toronto Junction main sewer Sec. No. 4, Bloor street tunnel, 2,400 ft. of 5 ft. x 6 ft. 6 in. Mayor. G. R. Geary.

Vancouver, B.C.

Tenders will be called at once for wood block paving of Seymour and Pacific streets. City Clerk, W. McQueen; City Engineer, F. Fellowes.

City Clerk, W. McQueen has recommended construction of 6-in. water mains at an expenditure of $13,217; 8-in. water mains, $6,885; 12-in., $2,848. City Engineer. F. Fellowes.

Vancouver Automobile Club; Secretary, Chas. A. Ross, are interested in the proposed pavement of road between Vancouver and New Westminster, as a link in the Pacific Highway. Club contributes $10,000 towards scheme.

Winnipeg, Man.

Tenders will be called shortly for supply of stone crusher to cost $10,500. Secretary Board of Control, M. Peterson. Specifications not prepared yet.

Railways, Bridges and Wharves

Burnaby, B.C. (Pitt River)

Reeve, Weart; Clerk, W. Griffiths. Engineer McPherson in charge of the extensive 1912 road improvements has asked council for additional plant consisting of portable rock crusher and bin; steam wagon and dump wagon, road graders, scrapers and ploughs. Cost, $12,930.

Carman, Man.

Tenders are called for two bridges; supply of piles, timber and lumber, iron material; work in erection; 25,000 ft. 2x 8, 2x10, 2x6, B.C. fir, 16 ft. long. Plans, etc., at office of Manitoba Government Engineer at Winnipeg or at office of Secretary. Received by secretary until noon Feb. 17th.

Chatham, Ont.

Option has been secured on a site and plans are being prepared for freight shed for the Canadian Pacific Railway. Work to commence in the spring. Superintendent Hodge, London, is in charge.

Cooksville, Ont.

Plans have been prepared for station, for Canadian Pacific Railway. Superintendent of Work, Mr. Hodge, London. All interior fittings, lighting and heating apparatus, telegraph equipment, etc, will be purchased.

Ingersoll, Ont.

Canadian Pacific Railway, Montreal, are contemplating the erection of a steel bridge, grading, etc., to cost $30,000. Superintendent in charge, Mr. Hodge, London.

Minto, N.B.

Tenders are called for railway to cost $750,000, York & Sunbury Counties, for Fredericton & Grand Lake, Coal & Railway Co. President, Sir Thos. Tait; Secretary, R. B. Hanson, Fredericton; Engineer, D. F. Maxwell, Fredericton. Surveys made (30 m.) Estimates being prepared. Contract soon to be let—standard gauge—work to start in spring.

Niagara Falls, Ont.

Repairs will be made to electric railroad for Wesley Park & Drummondville Railway. E. Sexias, manager, St. Catharines. The City Council has ordered company to renew bonding on about 3 miles single track.

Ottawa, Ont.

The Railway Commission have given the C. N. R. permission to proceed with 44 ft. subway, unless city pay extra for 66 ft.—action must be taken within ten days.

City is contemplating the widening of bridge on Argyle avenue over Rideau Canal. City Engineer, N. J. Ker.

Plans are prepared for bridge to cost $105,000, over Rideau Canal at Pretoria avenue. City Engineer, N. J. Ker. Tenders will be called as soon as plans have been approved.

Portage la Prairie, Man.

A petition has been presented to council asking for steel bridge, with stone abutments over High Bluff Ferry. Reeve, R. J. Coskey; Clerk, D. McCowan.

Ridgeway, Ont.

Tenders are called for extension to pier to cost $5,000, for Crystal Beach Co., Ridgeway, Ont. Architect, A. E. Nicholson, St. Catharines. Frame building on piles, electric lighting, patent roofing, 24 x 36. Tenders received by Crystal Beach Co., 60 Main street, Buffalo.

St. Catharines, Ont.

Grand Trunk Railway Co. have under consideration a station and railroad spur to cost $500,000. Spur from present main line to Northern section of City connecting with present Welland Division line. City will also petition the railway for erection of new $50,000 station.

Strathroy, Ont.

Tenders are called for steel bridge for Township of Metcalfe. Clerk, Richard Ward. 30 ft. steel bridge with concrete floors and abutments.

Union Bay, B.C.

Plans are approved for extension of railroad to Duncan Bay. Owner, Esquimault & Nanaimo Railway. Superintendent, H. E. Beasley, Victoria; Divisional Engineer, R. A. Bambridge, Victoria. Extension up east coast of Vancouver Island. Copies of plans approved at Ottawa filed with provincial authorities indicating location, etc.; clearing and grading already begun.

Vancouver, B.C.

City Engineer F. Fellowes was instructed to prepare estimates for the proposed Fraser Valley car line.

CONTRACTS AWARDED

New Westminster, B.C.

Jetty to cost $171,000 for Dept. of Public Works, Ottawa. Contractor, T. F. Sinclair, New Westminster; 6900 ft.—3100 ft. single bulkhead and 3800 ft. double bulkhead. Work to be completed in one year.

Quebec, Que.

Contract is awarded for Bascule steel bridge over St. Charles River, to Contractor J. H. Gigorac & Company, Quebec, $145,010. City Engineer, W. D. Baillairge.

St. John's, Que.

Concrete bridge to cost $150,000. Contractors, Laurin & Leitch, 5 Beaver Hall Square, Montreal. Engineers will shortly call for tenders for material for Bascule bridge over canal and reinforcing steel for bridge over Richilieu River.

Vancouver, B.C.

Contract is awarded for ten steel bridges to cost $1,300,000 for Canadian Northern Railway. Engineer, W. J. Harrington, Waddell & Harrington, Kansas City, U.S.A., also 739 Hastings street west, Vancouver. One bridge over Fraser River at Cisco; another at Lytton, seven across the Main Thompson and the tenth across North Thompson near its junction with Thompson north of Kamloops.

Public Buildings, Churches, Schools, etc.

Alexander, Man.

Plans are in preparation for public school to cost $20,000. Chairman, H. J. Hensley. Architect, Shillinglaw & Marshall, Brandon. 2-storey, 6 rooms, brick, concrete foundation, hot air heating, shingle roofing. Tenders called about Feb. 15th.

Brantford, Ont.

Robert Trench, Teeswater, has applied for a permit to erect skating rink to cost $10,000; 92 x 210, two floors and galleries, concrete walls, 8 feet high, supporting arched roof, covered with corrugated iron. Site purchased between Alfred street and the canal between the lines of Arthur and Mary streets.

Brussels, Ont.

Plans will be prepared for church to cost $8,000, for Melville Presbyterian Church. Work will probably be completed this year.

Calgary, Alta.

A permit has been applied for to erect picture theatre to cost $30,000, for J. C. McNeil, 403 4th avenue west, Calgary. Architect, J. A. Dagne, Dominion Bank Bldg., Calgary. Three-storey, 25 x 130, brick, of steel construction, concrete foundation, steam heating, electric ltg., tar and gravel roofing, laminated floors. Owner is builder.

The Dominion of Canada Customs Department have purchased land on 10th avenue and 1st street E. for the erection of a customs house to cost $300,000.

Caughnawaga, Que.

Plans are being prepared for golf club house, (Kanawaki) for Outremont Golf Club, Montreal. Secretary, J. D. Baile, 69 McGill street, Montreal. 1½-storey, 40 x 110, 25 bedrooms and 350 lockers, concrete, and wood shingles.

Dayspring, N. S.

Tenders are called until Feb. 20th for erection of barn. Specifications at store of Bates & Freeman, Bridgewater, and at office of chairman. Commissioners, Municipal Poor Asylum. Chairman, W. Brent, Mahone Bay, N.S.

Edmonton, Alta.

Tenders are called until Feb. 15th for school, Parkdale. School architect, G. E. Turner. 12 rooms. Plans etc. approved.

Tenders are called until Feb. 15th for addition to school, (Alexander Taylor School). School architect, G. E. Turner. Plans, etc., approved by board.

Fingal, Ont.

Plans are being prepared for erection of a new school for John T. Findlay, St. Thomas, Ont. Work it is stated will start in the spring.

Hamilton, Ont.

Board of Education; secretary, R. H. Foster, City Hall, contemplate erecting a new Collegiate Building. Chairman, Building Committee, J. E. Wodell, Spectator office. Matter to be taken up later in the year.

Hensall, Ont.

It is expected here that work on the erection of a new town hall will be started early in the spring. Clerk, Robt. Bonthorn.

Kenora, Ont.

Separate School Board plan to erect a new 7-room school in the spring, to cost $25,000. Chairman of Committee, Rev. Father Vizina. Secretary, Joseph Derry, Kenora.

Lindsay, Ont.

Police Committee (Ald. Alex. Horn, chairman), recommends to council following improvements to lock-up: ventilators, cement ceiling, iron guards on inside of windows, another cell (probably steel) to be constructed and furnished, slatted iron doors, new eve troughing. Work likely to be done, present condition condemned by court.

London, Ont.

Plans are prepared for church and rectory to cost $35,000 for Congregation of St. Michael's; Rector, Father Hanlon. H. C. McBride, architect, has prepared plans for new church, $35,000, and rectory. Work it is stated will commence as soon as possible in the spring. Interior fittings, furnace, etc., purchased later.

Victoria Hospital Trust plan to erect new Hospital Buildings, to cost $6,000. Superintendent of Hospital, T. H. Heard. New wards and quarters for the servants will be provided.

Megantic, Que.

Tenders are called for post office and customs fittings for Department of Public Works, Ottawa. Secretary, R. C. Desrochers. Plans, etc., on application to T. Lemay, Megantic. A. Lymburner, Superintendent of Buildings, Montreal, and at the Department. Received until 4 p.m. February 14th.

Montreal, Que.

St. Patrick's Amateur Athletic Ass'n, 492 St. Urbain street, Montreal, are planning alterations to club house (St. Urbain above Sherbrooke street). Architect, Fitz. James E. Brown, House of Brown, St. James street, Montreal. Club House to be altered and a gymnasium 60 x 80 to be built in rear.

Nanaimo, B.C.

Plans are being prepared for theatre to cost $40,000 for James Young. Architect, Angus B. Stroud, Carter-Cotton Bldg., Vancouver. 3-storey, mill construction, brick and concrete. Plans ready in about five weeks.

Nelson, B.C.

St. Paul's Presbyterian Church; Pastor, Rev. E. S. Logie; Secretary, G. S. Rees, are contemplating the erection of a new church. Special committee to report on building at a congregational meeting to be called.

New Westminster, B.C.

Plans are prepared for two new schools (West End and High School). Architects, Gardiner & Mercer, Westminster Trust Bldg. Plans for West End to be ready for figuring on in about a week; those for the High School last of February. Contract for addition to new Sapperton school awarded to W. Foster.

Ottawa, Ont.

A site has been purchased for vaudeville theatre to cost $75,000, Bank and Archibald streets. Interested, D. J. Driscoll, 143 Gloucester street, Ottawa, and G. F. Driscoll, Manager Orpheum Theatre, Montreal. Plans to be prepared shortly and work will start in the spring.

A permit has been granted to erect a Government Building to cost $25,000 at 182 George street, for Department of Mines, Parliament Bldg., Ottawa. Work will start in the spring.

Plans are being prepared for new Sunday School to cost $80,000, on Cooper street, for Bank Street Presbyterian Church. Pastor, (Building Committee) Rev. J. H. Turnbull. Architect, A. Hutchison (Hutchison, Wood & Miller) 50 Royal Ins. Bldg., Montreal, is preparing plans.

City Council has approved of initial outlay of $20,000 on Public Conveniences in the city. City Engineer, N. J. Ker.

Plans are contemplated for Club and Office Building (Elgin and Albert sts.) for E. Larmouth, Gordon Stewart and E. R. McNeil, all of Ottawa. Architect, A. L. Weeks, Canada Life Bldg., Ottawa. Four storeys, 64 x 100. The Laurentian Club will lease part of the building for ten years. Offices on ground floor; reading, dining, lounging rooms on first; card and billiard rooms on second; members' apartments.

Portage La Prairie, Man.

The citizens are petitioning for a Drill Hall in connection with armouries being built by Snyder Bros.

Quebec, Que.

Tenders will be called shortly for a fire station to cost $20,000 on Champlain street. Architect, Emile Languay, Quebec. Stone foundation, hot water heating, electric lighting, galvanized iron.

St. Davids, Ont.

Plans are being prepared for school to cost $6,000, Queenston Stone road. Chairman, Jos. Hanniwell, St. Davids. Architect, C. M. Boster, Niagara Falls. 1-storey, 40 x 70, brick, stone foundation, steam heating, electric lighting, slate roofing, ash trimming and maple floors, fire escapes, ventilating system.

St. Catharines, Ont.

Plans are being prepared for alterations to church to cost $10,000, for St. George (English Church). Rector, Rev. Braw. Architect, Symons & Rea, Toronto. Church to be remodeled and redecorated.

Sandwich, Ont.

Tenders will be called for convent & Academy to cost $15,000. Interested, Rev. Father Cote, Sandwich. Architect, W. E. Cloutier, Chambers of Commerce, Detroit, Mich., U.S.A. 3-storey, 48 x 75, solid brick, brick foundation, steam heating, electric lighting, slate roofing, oak floors, pine trimming, refrigerator.

Toronto, Ont.

Plans are approved for school building. $30,000 work-shop rear of Jesse Ketchum School and $10,000 supply building at Lansdowne School. Supt., Mr. Bishop, City Hall. Secretary, W. C. Wilkinson.

The Board of Education; sub-committee, Inspector Hughes and Trustee Hiltz. Board are considering the advisability of erecting a large addition to Kew Beach School.

Vancouver, B.C.

Competitive plans are invited for new Club House for Vancouver Club, 901 Hastings street, Vancouver. Competition limited to Vancouver architects and members of the Club. If design is chosen from plans submitted an established architect in the city will complete them. The site chosen is likely to be on Hastings street, adjoining Metropolitan Club.

Plans will be ready in March for new Drive. Secretary, C. W. Murray, Cambie school to cost 375,000, 12th and Victoria street, Vancouver. School Architect, N. A. Leech. Brick and stone.

Country Club, Point Grey, are planning to make alterations to Club building to cost $5,000. Architect, R. P. S. Twizzell, 1019 Metropolitan Bldg. F. Parsons will look after construction. New kitchen, dining room, etc., are included in plans.

●Plans will be ready in May for addition to school to cost $25,000, Central street, for Vancouver School Board. Secretary, C. W. Murray, Cambie street, Vancouver. School architect, N. A. Leech.

Plans will be ready in April for two additions to school to cost $130,000 for Vancouver School Board. Secretary, C. W. Murray, Cambie street, Vancouver. School architect, N. A. Leech, By-law for $776,500 carried.

Plans will be ready in March for a school to cost $150,000, Dawson street. Secretary, C. W. Murray, Cambie street, Vancouver. School architect, N. A. Leech.

A committee has veen chosen by Fire & Police Committee, Alds. Williams, Crowe, and Woodside to invite plans from city architects for new city jail. Report to be presented at next meeting. By-law voted $150,000 in January for Police Headquarters. City Clerk, W. McQueen.

Welland, Ont.

Tenders are called for church to cost $15,000, Division street, for Church of England. Rector, Rev. Thompson. Architect, A. F. Nicholson, St. Catharines. 1-storey, 75 x 46 ft. 5 in., stone, slate roofing, stone foundation, steam heating, gas and electric lighting, ash trimming, interior finish. Received by A. E. Nicholson, St. Catharines, until March 12th.

Windsor, Ont.

Plans are being prepared for Masonic Temple to cost $80,000, Ouelette Ave. President, G. English; Secretary, E. B. Winter. Architects, Crane & Pennington, Windsor. Four storeys and basement, 100x92, brick, stone and terra cotta, concrete foundation, steam heating, electric lighting, composition roofing, interior finish oak and pine, fire escapes, vaults, elevator, ventilating system. Tenders received by architects in March until March 15th.

Winnipeg, Man.

Mayor, Waugh. Secretary Board of Control, M. Peterson. Board of Control decided after a conference with the architects Association to call for plans for City Hall. Plans will include complete building. Only western office part to be built at once.

Woodstock, Ont.

The Salvation Army are contemplating erection of addition to Barracks. New front, extension to back, interior remodelled, and new roof. $2,500 on hand, immediate efforts to raise balance in time for construction in spring. Total cost, $4,500.

Yorkton, Sask.

Tenders will be called for Public School to cost $53,000. Architect, J. Pender, West 607 Somerset Bldg., Winnipeg. 2-storey and basement, 109 x 72, brick, reinforced concrete floors, concrete foundation, steam heating, electric lighting, shingle roofing, oak trimming, maple floors, interior finish, ventilating system not decided.

Youville, Que.

The School Commissioners propose to erect a new school to cost $12,000. Architect, C. St. Jean, 62 St. James street, Montreal. Four storeys, stone and brick, stone foundation.

CONTRACTS AWARDED

Brantford, Ont.

School to cost $45,000, Chestnut ave., for Board of Education; Secretary, A. K. Bunnell. Architects, Taylor & Taylor, Brantford. Two storeys and basement, 84 x 112, ten rooms, brick with reinforced concrete floors, concrete foundation, steam heating, electric ltg., slate roofing, interior finish hard maple trim, black ash, ventilating fan, stand pipes, telephones, two dynamos (1½ h.p. and 5 h.p.), modern plumbing. Contract for building to be awarded in a few days to The Schultz Bros., Ltd., Brantford. Work to be completed by September 1, 1912.

Montreal, Que.

Blind Institute to cost $40,000 for Montreal Association for the Blind. Representative, Mr. P. E. Layton, St. Catherine street. Architect, Hutchison, Wood & Miller, Royal Ins. Bldg. General contractor, C. E. Deakin, 11 St. Sacrament street. Brick and stone, masonry foundation, steam heating, gas & electric lighting, flat gravel and cement tar roofing, reinforced concrete floors, 2 storeys, 89 x 47, terra cotta in walls, 1 iron fire escape. Work not started.

Quebec, Que.

Fire Station. Architect, Reine Lemay, Quebec. General contractor, Lamonde & Ginchereau, Quebec. 2½-sty., 50 x 30, stone and fire brick, wood, stone foundation, hot water heating, electric lighting, galvanized iron; fire escapes, Work to commence April 1st.

Strathcona, Alta.

Tenders have been called for Public Library. Architect, Wilson & Herrald, Strathcona. General contractor, William Deitz. Plumbing and heating, Carter & Co., Main street S. 2 storeys and basement, brick and Roman stone.

Toronto, Ont.

Club House to cost $20,000, Toronto Island, for Royal Canadian Yacht Club. Architect, John M. Lyle, 14 Leader Lane. Builder, A. Weller & Co.

Residences

Cairngorm, Ont.

Jacob Beer will erect a new brick residence in the spring. Two storeys, brick. Cost $3,000.

Calgary, Alta.

A permit has been granted for two residences to cost $4,000, New Edinboro street, for A. M. Mitchell, 222 4½ street, N.W. Frame, concrete foundation, hot air heating, electric lighting, shingle roofing, 2-storey, 20 x 38 each. Owner is builder.

A permit has been granted for two residences to cost $5,000, Sunnyside, for J. H. Whittleton, 216 17th Ave. W. 2-storey, 19 x 36, frame, concrete foundation, electric lighting, shingle roofing, hot air heating. Owner is builder.

A permit has been granted for two residences to cost $4,000 for J. A. Knapfli, 1710 10th street west; 2-storey, 18 x 36, frame, concrete foundation, hot air heating, electric light, shingle roofing, hardwood flooring.

Sketches are being prepared for apartment house to cost $60,000, for D. J. Gunn, Banff, Alta. 50 x 120, brick, mill construction, steam heating, marble entrance. Further information in about ten days. No architect chosen.

Hamilton, Ont.

Plans are being prepared for residence and stables to cost $18,000, for Col. W. H. Bruce, c/o Bruce Seed Co., King and McNab streets. Brick and stone.

W. O. Sealy, 64 Hunter street west, plans to erect two apartment houses to cost $20,000. Architects, Watt, Blackwell, 125 Lister Block, Hamilton. Contract likely to go to R. & J. Poag, Leeming street., Hamilton.

Tenders will be called shortly for two apartment houses to cost $20,000, Charles street, for W. O. Sealey, 64 Hunter st. W., Hamilton. Architects, Watt & Blackwell, 125 Lester Block, Hamilton. Eight flats in each, red pressed brick, stone trimmings, hard wall plastering

(Continued on page 65)

Tenders and For Sale Department

To Architects and Engineers

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

Hamilton Water-Works Extensions

Tenders will be received up to 5 o'clock p.m., **February 28th, 1912**, for the supply and delivery of 2,200 lineal feet of 48-inch steel intake pipe with expansion joints, intake and flanged specials, sluice valves, bolts and gaskets.

Tenders to be made upon forms supplied by the City and to be by registered mail, in care of the City Clerk, addressed to Geo. H. Lees, Mayor, Chairman, Board of Control, Hamilton, Ont.

Plans and specifications can be obtained from A. F. Macallum, City Engineer, City Hall, Hamilton.

S. H. KENT,
City Clerk.

City Hall, Hamilton,
February 8th, 1912.
7

Tenders Wanted

Sealed tenders marked "Tenders for Bridges," will be received by the undersigned until noon **February 17th, 1912**, for the erection of two bridges over the Boyne River at Carman, Man.

(1) For the supply of Piles, Timber and Lumber.

(2) For the supply of Iron Material.

(3) For the work in erection and construction of the two bridges.

(4) For the erection and construction of each bridge, contractor to supply all labor and material required.

All material to be delivered at Carman not later than April 1st, 1912.

(5) For 25,000 ft. 2 x 8, 2 x 10 and 2 x 6 B. C. Fir, 16 ft. long.

Plans and Specifications for Bridges may be seen at the office of the Manitoba Government Engineer at Winnipeg, Man., or at the office of the undersigned.

The lowest or any tender not necessarily accepted.

A. MALCOLMSON, Sec.-Treas.,
Town of Carman.
6-7

CITY OF SASKATOON

Electrical Supplies

Sealed tenders, addressed to the City Commissioners, Saskatoon, and marked on outside of envelope "Tender for Electrical Supplies," will be received up to twelve o'clock noon on **Thursday, 22nd February, 1912**, for furnishing Meters, Transformers, Wire, Globes, and other electrical supplies required by the City during the year 1912.

All information may be obtained on application to the City Commissioners.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., Feb. 8, 1912.

Notice to Contractors

Tender for

30 Inch Outlet Pipe

Sealed tenders addressed to the Chairman of the Board of Control, Ottawa, endorsed "Tender for Sewer Outlet," for approximately 2,500 feet of 30-inch steel pipe in connection with the West End Drainage System will be received by the Secretary of the Board of Control, City Hall, Ottawa, up to 4 p.m., **Thursday, February 15th, 1912**, for the supply and laying same in the Ottawa River.

Any tender received after the above stated time will be declared informal.

Specifications, form of tender and full particulars may be obtained on application at the City Engineer's Office, City Hall, Ottawa.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
City Engineer.
Ottawa, February 6th, 1912.
7

Tenders for Abutments and Steel Bridge or for Arch Bridge

Sealed tenders addressed to the Clerk of Saugeen, Port Elgin P. O., will be received up to **Tuesday, the 27th day of February, 1912**, for the following:

1. Abutments and Reinforced Concrete Floor.
2. Steel Superstructure.
3. Arch Bridge.

For a bridge 90 feet span over Mill Creek near Port Elgin.

A marked cheque for five per cent. of contract price payable to Treasurer, Saugeen Township, shall accompany each tender, which shall be held as security for the accepted tender and will be returned with unaccepted tenders.

The lowest or any tender not necessarily accepted.

Plans and specifications may be seen at the Clerk's office, Port Elgin, or the Engineer's office Owen Sound.

R. McDOWALL, C.E., Engineer.
F. W. ELLIOTT, Clerk.
7-8

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
Chicago, Ill.
t.f.

CITY OF SASKATOON

Tender for Materials

Sealed tenders, addressed to the City Commissioners, and endorsed according to the material tendered on, will be received up to 12 o'clock noon on **Friday, March 1st, 1912**, for the following:—

Contract No. 105—Furnishing Sewer Pipe and Junctions.
Contract No. 106—Furnishing Cast Iron Pipe and Specials.
Contract No. 107—Furnishing Manhole and Catch Basin Frames and Covers.
Contract No. 108—Furnishing Valves and Hydrants.
Contract No. 109—Furnishing Material for Water Connections, including Lead and Galvanized Iron Pipe, Corporation Brass Goods and Service Boxes.

The Corporation reserves the right to reject any or all tenders.

All information may be obtained on application to George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., Feb. 7, 1912.
7-8

CITY OF SASKATOON

Electrical Equipment

Sealed tenders, addressed to the City Commissioners, and endorsed "Tender for Electrical Machinery," will he received up to twelve o'clock noon on **Friday, March 8th, 1912**, for the following apparatus:—

5—500 B.H.P. Water Tube Boilers.
5—Sets of Automatic Stokers.
Induced Draft Plant and Duplicate Plans for same.
Economizers for 2,000 H.P. capacity.
2—Feed Pumps.
All necessary equipment for the above.
1—2,000 K.W. High Pressure Steam Turbine with Condenser, Air Pumps, and necessary equipment.
2—75 K.W. Turbine Exciters.
1—Generator Panel.
2—Exciter Panels.
With all necessary cables and apparatus from Turbine to Switchboard.

Instructions to Bidders and forms of tender will be furnished on application.

The lowest or any tender not necessarily accepted.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., Feb. 8, 1912.

Relaying Rails For Sale

12 miles 56 and 60 lb. per yd. with fish plates.
10 miles 80 lb. per yard with angle bars.
4 miles 65 lb. per yard with fish plates.
Also 12, 16, 20, 25 and 50 pound.
New, light rails, all sections, in stock.

JNO. J. GARTSHORE,
58 Front Street West,
Toronto, Ont.
7-8

Tenders Wanted

Sealed tenders addressed to J. A. Smith, Clerk of the Township of Brantford, will be received up till noon on **Saturday, the 24th day of February, 1912**, for a steel bridge to be erected over Fairchilds' Creek in the Township of Brantford.

The lowest or any tender not necessarily accepted.

Specifications also on file at office of "Contract Record," Toronto, Ont.

J. A. SMITH,
Township Clerk.
Dated February 8, 1912. 7-8

Tenders Wanted

Sealed tenders addressed to the undersigned, and endorsed " Tender for Young Men's Christian Association Building, at Galt, Ont.," will be received at this office until **10 p.m.** on **Saturday, February 24th**, for the construction of a building for the Young Men's Christian Association on Queen's Square, Galt.

Tenders will be received for separate trades as follows: Masonry, cut stone, structural iron, carpentry, sheet metal, plumbing, heating, plastering, painting, composition roofing, glazing, Portland cement paving, electric wiring, marble and mosaic, but tenders including all trades in the contract will receive preference.

Plans and specifications may be seen at the office of the General Secretary of the Young Men's Christian Association, Water street, Galt, Ontario, or at the office of the "Contract Record," Toronto, Ont.

Tenders for all trades must be accompanied by an accepted cheque on a chartered bank, payable to the order of the "Treasurer of the Building Fund," equal to **5** per cent. of the amount of the tender in the case of tenders for any one trade, and of 2½ per cent. of the amount of tender in case of the tender for all trades, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fails to complete work contracted for. If the tender be not accepted the cheque will be returned. The lowest or any tender not necessarily accepted.

WILLIAM R. COOK,
General Secretary, Young Men's Christian Assn.
Galt, Ont., January 30, 1912. 7

Situations Vacant

Advertisements under this heading two cents a word per insertion. Box No. ten cents extra. Minimum charge 25 cents

Sales Manager

A Sales Manager is wanted at once for a Wire & Cable Company, manufacturing in Canada. Must have had experience in electrical or kindred business in Canada, and must furnish "A 1" references.

Apply by letter to 502 Merchants Bank Building, Montreal. 7

Situations Wanted

Advertisements under this heading two cents a word per insertion. Box No. ten cents extra. Minimum charge 25 cents

Architect and Surveyor, A.R.I., B.A. (25), requires post in spring. Thoroughly efficient. 22 Southborne Grove, Bournemouth, England. 6-7

TENDERS WANTED

Cast Iron Pipe

Sealed tenders addressed to T. W. Brooke, Esq., Chairman, Water Commissioners, Windsor, Ontario, will be received by the undersigned up to 12 o'clock noon on **Monday, February 26th, 1912**, for 100 tons and upwards of cast iron water pipe, size from 6-in. to 12-in., and according to standard weight and thickness. All pipe to be tested to 300 lbs. per square inch. Delivery of 50 tons to begin by March 20th and continue as required.

A certified cheque for $200 must accompany each tender, which cheque will be returned at once to the unsuccessful tenderer, but in the case of the successful tenderer will be held as forfeit until the contract is completed.

The right is reserved to reject any or all tenders.

W. A. HANRAHAN,
Secretary.
Windsor, Ont., Feb. 9, 1912. 7-8

Residences

(Continued from page 63)

modern plumbing, wiring, combination fixtures, composition roof.

Maisonneuve, Que.

Plans are being prepared for residence to cost $10,000, 130 Third Ave., for A. Gratton, 130 Third avenue, Maisonneuve. Architect, C. A. Reeves, 58 St. James street, Montreal. Three storeys, stone construction, concrete foundation, gravel roof, electric lighting, skylights, electric bells, etc.

Kenilworth, Ont.

Tenders are called for residence to cost $3,000, Con. 9, Arthur Tp., for D. McGillicuddy, Kenilworth P.O. Architect, Mr. Grey, Harriston. 2-storey, 28 x 32, pressed brick, stone foundation, hot air heating, ash and pine interior finish.

Niagara Falls, Ont.

Tenders are called until March 1st for residence to cost $8,000, Main street, for Mrs. Sizer, Buffalo. Architect, A. E. Nicholson, St. Catharines. 2-storey, 55 x 80, frame and shingle, concrete foundation, shingle roofing, hot air htg., electric conduit. Pine and white wood with oak floors, refrigerators.

Ottawa, Ont.

A permit has been granted for an addition to residence to cost $3,800, Stewart street, for A. Major. General contractor, J. B. Davis, 272 Clarence street, Ottawa. Brick veneer.

F. A. Wilson, 53 Belmont avenue, is excavating for residence to cost $7,500, Somerset street; 2-storey, 79 x 31, double brick veneer and ironclad.

Parkhill, Ont.

Work will commence early in spring on the erection of a residence to cost $3,000, for B. McCubbin, Springbank, Ont.

Summerville, Ont .

Thomas Brompton is interested in the proposed erection of a new residence to cost $3,000; plans for which are now being prepared.

St. Catharines, Ont.

Tenders are called for 200 residences, $1,500 to $2,000 each, Lake street, for Locke & Groce, real estate agents. Two-storey, 22 x 28, frame, concrete foundation, hot air, gas and electric lighting, shingle roofing, pine finish. It is reported that this firm will erect 200 to 300 of these houses at once. Work will start in early spring.

Toronto, Ont.

Geo. Griffin, 55 Breadalbane street, is contemplating the erection of apartments to cost $4,000, 98 St. Vincent St. 2-storey, brick, tar and gravel roofing.

W. J. Kernohan, Warren road, is planning to erect a new house on Warren road; shingle roofing, cut stone, plate glass, mantles, tiles, hardwood finish. Cost $5,000.

Plans are in progress for apartment house to cost $26,000, Deer Park Cres. near Oriole road, for T. P. Stewart, 212 Poplar Plains Rd. Architect, J. H. Galloway, 23 Toronto street. 3-storey and basement, brick, stone foundation, cut stone, mantles, tiles, hradwood floors, stucco, tar and gravel roofing.

E. C. Finch, 132 Sunnyside avenue, will build a new house at 164 Westminster avenue. Cost $5,000. 2-storey and attic, brick, shingle roofing.

Excavation done for two pair dwellings to cost $8,000, Woodville avenue, for J. Bell and D. Shirton, 185 Humberside avenue. Semi-det., brick, stone foundation, tar and gravel roofing.

Plans are in progress for residence to cost $4,000, Greenwood avenue, for F. C. Larkins, 73 Frizzel avenue. Architect, P. H. Finney, 43 Victoria street. 2½-storey, brick front and roughcast sides, shingle roofing.

Plans are drawn for residence to cost $3,000, Ivy avenue west side, for W. Chapman, 124 Curzon street, Toronto. Architect, J. Birmingham, 1225 Queen street E. 2-storey, brick veneer, shingle roofing.

Plans are drawn for two detached residences to cost $5,000, Albermarle avenue near Logan, for H. Jones, 53 1st Ave., Toronto. Architect, P. H. Finney, 43 Victoria street, Toronto. 2½-storey, brick.

Tenders are called for apartments to cost $5,500, Gorevale avenue, for Dundas Building Co., Murray street; 2-storey, brick.

Plans are in progress for two detached apartment houses to cost $16,000, 350 Ossington near Dundas, for R. K. & M. D. Grimshaw, contractors, 459 Avenue road, Toronto. 2½ storey, brick.

Tenders are open for three attached residences to cost $6,000, Massey street near Defoe, for F. Angotti, Est. 7 Pendrith avenue. Architect, J. A. McDonagh, 49 Wellington street. 2½-storey, brick, tar and gravel roofing.

Tenders are open for apartment house to cost $30,000, S.E. cor. Grange and Ryerson, for Caplan Bros. and Layvesky 231 Augusta avenue. Architect, J. G. Hedges, 86 Clinton street. 2-storey and basement, brick, tar and gravel roofing, structural steel, cut and art stone, mantles and tiles, hardwood finish, plate and art glass, galvanized cornice, galvanized iron.

Plans have been prepared for residence to cost $4,000, 146 Bedford road, for F. H. Urquhart, St. George street. Architect, J. H. Stanford. Brick, 2 storeys and attic.

Plans are completed for pair residences to cost $5,000, Sheridan avenue and Montray, for Geo. Pearson, 17 Sheridan avenue, Toronto. Architects, J. H.

Galloway, Toronto street. 2½ storeys, semi-detached, brick, shingle and tar roofing, hot water heating, gas and electric lighting, mantles and tiles, pine trimming.

A permit has been granted to erect a residence to cost $2,500, Boultbee ave. near Jones, for Andrew Mans, 123 Boultbee avenue; 2-storeps, brick.

Plans are drawn for pair dwellings to cost $4,000, for W. Winthorpe, 30 Phoebe street. Architect, H. H. Madill, 23 Grange road; 2-storey and attic, semi-detached, brick.

Tenders are open for three attached residence to cost $6,800, Massey street, for Angotti & Pellitier, 7 Pendrith ave., Toronto; 2½ storeys, brick.

Plans are completed for apartments to cost $5,100, Edna avenue cor. Barrett, for W. J. Greenway, 37 Hewitt ave., Toronto. Architect, Thos. Harris, 43 Howard Park avenue, Toronto. Brick, stone foundation.

Vancouver, B.C.

Plans will be ready next month for apartments to cost $100,000, 5th Ave. near Hewitt, for Hume & Hewitt, Dominion Trust Bldg., Vancouver. Six-storey, 50 x 114, solid brick, 48 apartments each with bath, automatic electric elevator, wire glass, hot water heating tar and gravel roofing.

Plans are being prepared for residence to cost $20,000, Shaughnessy Heights. Architect, Parr & Fee, 570 Granville St., vancouver. Frame and stone. 14 rooms. Architect also preparing.

Plans will be ready in March for apartments to cost $35,000, Jervis and Alberni streets. Architect, Thompson & James, 412 Seymour street, Vancouver Four-storey, brick and stone. Tenders on general contract called about March 1st; will not include plumbing or heating.

Plans are being prepared for apartments to cost $75,000, Hastings street E. Architect, Parr & Fee, 570 Granville street, Vancouver. Eight storeys, steel and brick, 15 x 120. Tenders taken in a few days from selected contractors.

Walkerville, Ont.

H. R. Dingwall will build a residence and garage to cost $15,000, Devonshire road. Architect, Burroughs & Wells, Detroit, Mich. 2-storey, 62 x 84, brick (pressed and common) and steel, concrete foundation. steam heating, electric lighting, shingle roof, refrigerator, telephones.

Plans are being prepared for several family terraces on Monmouth road. Architects, Stahl & Kinsey, Walkerville, Ont. To be of brick and stucco construction.

Sketches are peing prepared for residence and garage, Devonshire road, for Hiram Walker, Jr., Walkerville. Architect, Burroughs & Wells, Detroit, Mich. Brick and stucco.

CONTRACTS AWARDED

Calgary, Alta.

A permit has been applied for to erect a residence to cost $7,000, Elboya Ave., for A. McKellop, 7 avenue W., Cal. General contractor, G. A. Doris, Cedar avenue, Calgary. Two storeys, 38 x 40, brick veneer, concrete foundation, steam heating, electric lighting, shingle roofing, hardwood floors.

Gordonville, Ont.

Residence to cost $2,500, for John Gear Gordonville. Address Lot 1, Con. 10, Tp. W. Luther. 2-storeys, 28 x 31, brick stone foundation, hot air heating, shingle roofing. General contractor, Garrett, Arthur, Ont. Painting, glazing, plumbing and heating contracts not let yet.

Residence to cost $2,750, Lot. 3, Con. 11, W. Luther, for John McLean, Gordonville. General contractor, Mr. Garrett, Arthur. 2-storey, 32 x 34, pressed brick, hot air heating, shingle roofing, pellow and white pine interior finish, stone foundation. Plumbing, painting, heating contracts not awarded yet.

Maisonneuve, Que.

Foundations are started for five flats to cost $4,700, St. William, for R. Bernard, 607 Lafontaine street, Montreal. General contractor, A. Allard, 558 Adam street; 3-storey, 25 x 45, pressed brick, electric lighting, gravel roofing, stove heating.

Montreal, Que.

Foundations are started for residence to cost $3,500, Cote Des Neiges, for Remi Goyer, Cote des Neiges road. General contractor, Nap. Gohier, Cote des Neiges road. Two-storey, 32 x 40, brick, stone foundation, hot water heating, electric lighting, gravel roof, flat.

Foundations are in for three flats to cost $9,000, Laval Ave. near Sherbrooke street, for W. Archambault, 249 St. Timothee street, Montreal. Architect, Z. Trudel, 238 St. Andre, Montreal. General contractor, Jas. Ethier, 637 LaSalle street, Montreal. Three storeys, 30 x 75, brick veneer, cement foundation, electric and gas lighting, gravel roofing.

Foundations are in for six flats to cost $7,000, Papineau Ave., for J. A. Lacombe, 1213 Simard street, Montreal. Architect, D. Viau, 76 St. Gabriel street, Montreal. Contractor, A. Champagne, 1182 Chabot street, Montreal. 3-storey, 39½ x 68, pressed brick, gas light, gravel roofing, concrete foundation.

Nine flats to cost $11,000, Wellington near Rockland, for Joseph Martel, 1220 Messier street, Montreal. Three storeys, 54 x 58, brick encased, stone foundation, gravel roofing. Owner is builder. Work not started yet.

Toronto, Ont.

Residence to cost $5,000, N.S. Walter street near Indian road, for A. J. Peppiatt, 204 Sunnyside avenue, Toronto. Architect, H. F. Sanders, 42 Leopold street, Toronto. 2½-storey, brick. Owner is builder.

Attached residence to cost $3,400. 406 Ravensden avenue, for Muirhead & Midland, 406 Ravensden avenue. Builder, G. V. Burgess, 105 Balmoral avenue. Brick and frame.

Contract is let for 1 pair residences to cost $5,500, Kenneth avenue near Dundas, for Fred Binns, 173 Campbell avenue, Toronto. 2½-storey, semi-det., brick, stone foundation, sheet, tin and shingle roofing. Owner is builder.

Residence to cost $20,000, Heath and Forest Hill road, for Wm. Caldwell, 131 Bloor street. Architect, F. S. Baker, Traders Bank Building. Masonry contractor, Gordon Bros., 16 Soho street, Toronto. Brick construction, stone foundation.

Plans are prepared for two detached dwellings to cost $3,900 (each), E.S. Balsam avenue, S. Queen, for Mr. Lyonde, King street west. Architect, R. J. Edwards & Saunders, Toronto street. Builder, Geo. W. Walters, 104 Ossington avenue. Two and a half storeys, brick and stucco, slate roofing.

Residence to cost $5,000, 55 De Lisle avenue, for Miss Smith, 274 Sumach. Builder, John McKerrachel, Pleasant avenue. Brick, shingle roofing, cut and art stone, mantles and tiles, hardwood finish, stucco, plate and art glass, two storeys.

Windsor, Ont.

Alterations to residence to cost $3,500, Victoria avenue, for Gordon McGregor, Windsor. Architect, Crane & Pennington, Windsor. Excavation—Parker Bros., Windsor. Carpentry—V. Williamson, Walkerville. Plumbing and heating—Walkerville Hardware Company, Walkerville. Contracts let February 5th.

Business Buildings and Industial Plants

Barrie, Ont.

Plans are prepared for alterations to Bank Building to cost $3,000, for Union Bank of Canada. Architect, H. Bryan, 47 Wellington street, Toronto. Tenders will be called as soon as plans are completed.

Botwood, Nfld.

The Newfoundland Pine & Pulp Company, New Bay, Nfld.; manager, Harry J. Crowe, plan to erect a double band and gang sawmill here next spring to replace mill burned last year.

Calgary, Alta.

A permit has been applied for sash and door factory to cost $7,000, E. Calgary, for A. A. Guy, 920 11th avenue W., Calgary. Two storeys, 54 x 80, frame, concrete foundations, steam heating, electric lighting, tar and gravel roofing. Owner is builder. About $5,000 will be spent in purchase of wood-working machinery.

A permit has been applied for to erect brewery to cost $150,000, Manchester sub., for Mountain Spring Brewing Co.; Mr. Knapp, Grand Union Hotel. Architects (supervising) Burrough & Richards. General contract not let yet. 64 x 172, brick, concrete foundation, steam heating, electric lighting, tar and gravel roofing. Machinery to be purchased.

Mr. Duckworth, Box 1924, will build a 3-storey Business Block, 130 x 40, on 12th Ave. between Centre and 1st Street west.

Wood, Vallance & Adams, King E., Hamilton, hardware merchants, are contemplating the erection of a 4-storey warehouse on 11th avenue between Centre and 1st street, to cost $50,000.

A permit has been applied for to erect offices to cost $4,000, for J. Steinbrecket, 9 ave. W., Calgary. Architect, Burrough & Richards, Crown Blk., Calgary. One-storey, 42 x 28, brick, concrete foundation, hot air heating, electric lighting, tar and gravel roof, furnace, etc.

The Ontario Wind Engine & Pump Co., Ltd., contemplate erecting a warehouse to cost $50,000 on Atlantic and Liberty streets. Architects, Hodson, Bates & Butler, Calgary. 4-storey, 50 x 130.

Edmonton, Alta.

Revillon Bros. propose to erect a warehouse to cost $300,000, 4th Atha-

(Continued on page 68)

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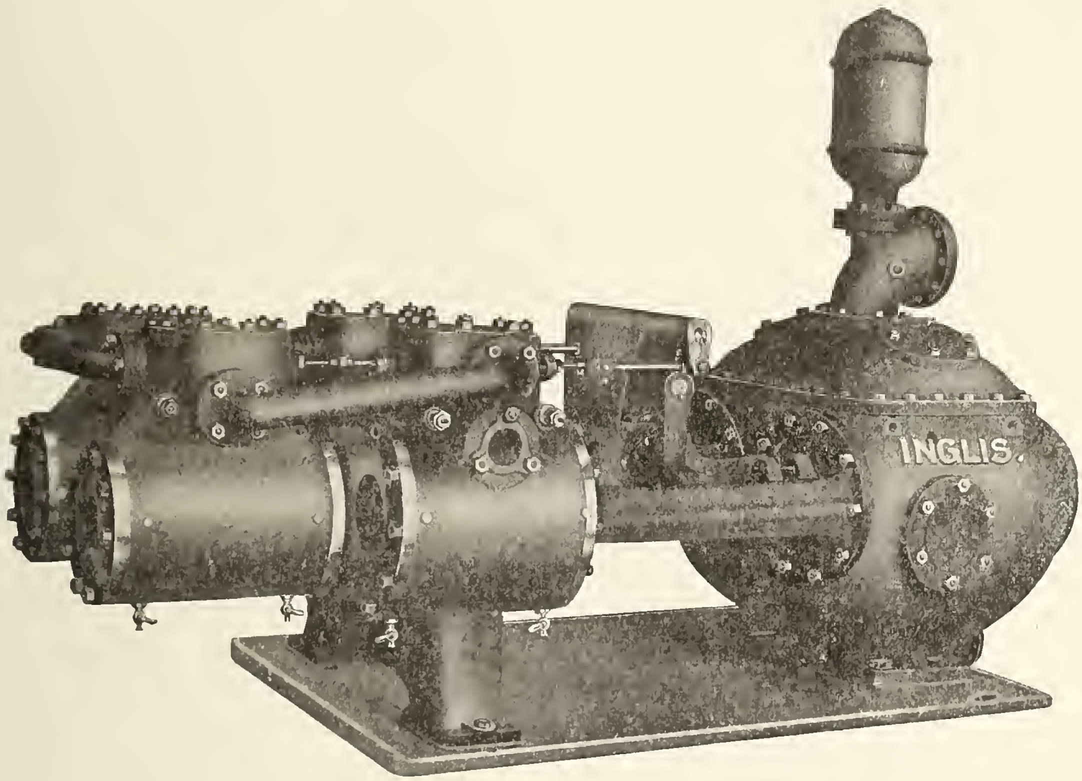

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basca; 4-storey, 150 x 140, reinforced concrete, concrete foundation, steam htg. electric light, tar and gravel roof, fire escapes and vaults, freight elevators. Company disposed of present site, forced to build this season. Architects invited to submit suggestive sketches.

Edmonton, Alta.

Specifications are completed for Hotel on McDougall avenue, for Grand Trunk Pacific. Superintendent of Hotel System, F. W. Bergman, Ottawa. Excavating to commence as soon as agreement between city and company has been approved.

Tenders are called for addition to Hotel on Jasper Avenue East, for N. Bell, proprietor Pendennis Hotel. Architects, Lang & Major, 656 First street, Edmonton. Erection of addition. Received by architects until 5 p.m., Feb. 15th.

Hamilton, Ont.

A site has been purchased for erection of a brick garage, King street E. of Sanford avenue, for R. Piott, Stoney Creek, Ont. No architect appointed yet.

Hanover, Ont.

Plans are being prepared for furniture factory for R. Traux & Son, (planing mill) Walkerton, Ont. Work will commence in spring, and new machinery will be required.

Hamilton, Ont.

Tenders are called until Feb. 15th for erection of a warehouse for Oliver Chilled Plow Works Co., Hamilton. Company's architects, Prack & Perrins, 4-storey, steel, concrete and brick.

A site has been qurchased for erection of a factory, Jackson street, near Walnut, for Toronto & Hamilton Electric Co. President, H. E. Job, 93 Mac Nab street N. Hamilton.

Wm. Goldberry, proprietor Commercial Hotel, Park and York streets, will have plans prepared by A. W. Peene, architect, 2 King street west, for alterations and additions to the hotel, corner Park and York streets.

Plans are being prepared for office building, Cannon street E., for Hendrie Cartage Co., Cannon street E. President, Wm. Hendrie, King and Hepburn streets. Architects, Stewart & Witton, 2 Hughson street S., Hamilton.

Kingston, Ont.

Plans are approved for Summer Hotel to cost $100,000, King street. Interested, Chas. E. Phoenix and others, of Boston; Jno. McKelvey, Kingston. City Council's architect, Wm. Newlands, 332 King street east, Kingston. Plans approved by Mr. Newlands. By-law carried by people granting guarantee of $100,000 awaiting sanction of Legislature this session.

London, Ont.

The London Printing & Lithographing Company, Manager, G. Coombs, have secured a site and plans will be prepared at once for an addition to their plant to cost $50,000. Work will be rushed.

H. C. McBride, Bank of Toronto Chmbrs., London, has prepared plans for new front and extensive interior changes to Molsons Bank. Work will be commenced shortly. Cost $35,000 .

Helena Costume Company, 196 King street, London. Geo. Burdick, manager, have been granted permission by council to extend system of heating in the spring, to include other buildings than those already supplied. Asbestos piping, steam radiators, etc., will be required.

Maisonneuve, Que.

Kirvan-Doig, Limited, Delorimer avenue, shoe manufacturers, plan to erect a shoe factory. Three storeys, concrete, 50 x 100. Plans not ready yet. Building to be finished by September. New machinery will be required.

Mattawa, Ont.

Foundations are in for Hotel to cost $16,000, Main street, for A. Valvois, Mattawa. Architect, H. W. Angus, North Bay. Three-storey and basement, 58 x 78, brick veneer, stone foundation, hot water heating, electric lighting, felt and gravel roofing, pine and hardwood floors. Owner will build by day labor. Work to comence at once.

Merritton, Ont.

Plans are completed for extension to carbide factory, Thorold road, for Canadian Carbide Co., Montreal Carbide Co. Brick, concrete, electric, metal, 35 x 50. Tenders received by M. King, Wilson Carbide Co., Merritton, Ont.

Middleton, N.S.

The Federal Government, Ottawa, plan to erect Hatchery, frame, concrete foundation, 70 x 36, $3,500; residence frame, concrete foundation, 38 x 25, $2,500, shingle roofing. Dam, concrete, $500. W. H. Brunel, architect, Ottawa, Ont.

Montreal, Que.

Tenders are invited for addition to Publishing Office, Ventilation of Church. Architect, A. F. Dunlop, 512 St. Catherine street west, Montreal. Private tenders invited for erection of new storey in rear section of "Star" office with other alterations; also for ventilation system of Christ Church Cathedral.

Tenders are called for new Brewery, to cost $500,000, between De Gaspe and Casgrain streets, for Frontenac Breweries Ltd., Montreal. Representative, Jos. Beaubin, Liverpool and London, and Globe Building, Montreal. Architect, Paul Ott, 50 Church street, New York, U.S.A. Tenders close next week. Exact date not specified.

Tenders are called for stores and apartments to cost $20,000, Fairmount and Esplanade avenues, for S. Armovitz, 1888 Esplanade avenue. Architect, A. St. Louis, 80 St. Gabriel street. Three-storey, 60 x 90, brick, hot water heating, electric lighting, gravel roofing, hardwood finish. Tenders on steel close about February 14th. Tenders on brick called after February 13th. Close a week later.

North Bay, Ont.

Plans are being prepared for cold storage building, C.P.R. property, for The Farmers and Consumers Co-operative Co., of New Ontario, Ltd., North Bay. Architect, H. W. Angus, North Bay. 2-storey, and basement, 50 x 100, solid brick, wood interior, concrete fndn., electric light, felt and gravel roofing, complete cold storage equipment Not far enough advanced to give details re equipment.

Ottawa, Ont.

The Bayne farm will probably be purchased by The Ottawa Dairy Co. Their intention is to make it a model dairy farm. Government and City Health Dept. Testing stations to be installed. Farm to be in operation within few months. Cost $10,000.

Nanaimo, B.C.

Plans are being prepared for Hotel to cost $30,000, for Victor Jany. Architect, Angus B Stroud, Carter-Cotton Bldg., Vancouver. 4-storey, mill construction, brick and concrete. Plans ready shortly.

North Battleford, Sask.

Tenders are called for Hotel to cost $50,000, King street, for Wm. Coad and G. W. Graves, N. Battleford. Architect, Stephenson & Evans, N Battleford. Three-storey, brick and stone, specifications include: cut stone, Tyndall lime, steel beams, structural steel (Man. Bridge & Iron Works); asbestos roofing (John Manville Co.) face brick, (Medicine Hat Pressed); pipe covering, (Manville's C. B.); steam heating (70° in zero weather, jacket boiler, 240 gal. capacity, connected with range boiler of 120 gal. capacity); plumbing, (55 lav. basins, 7 iron bath tubs, 15 ped. water closets with low flushing tanks, one 6-ft. wash out urinal trough, all enamelled); electric lighting, weather strips, fire escapes, plate and prismatic glass, pie covering, Neponset Paper, Floor and Ceiling joist anchors (Western Steel & Iron Co); steam heating, table for kitchen. Received until Feb. 17th.

Ottawa, Ont.

A permit has been granted for addition to stores to cost $4,000, Queen st., for A. G. Acres, 198 Queen street. Owner is builder.

Peterboro, Ont.

Tenders were called until Feb. 13th for factory to cost $30,000, for Canadian General Electric Co, King street west; 2-storey and basement, 325 x 80, brick.

Port Colborne, Ont.

Tenders will be called shortly for alterations and extensions of Bank Bldg. Main street, for Bank of Commerce. Brick, stone foundation, electric lighting. Address A. E. Nicholson, architect, St. Catharines.

Port Greville, N.S

H. Elderkin & Co. have under consideration the erection of a factory for manufacture of hardwoods into spindles, broom handles, chair bottoms, etc.

Ridgetown, Ont.

Plans have been changed for Canning Factory, for Dominion Canners Ltd., Hamilton. A much larger factory than at first proposed will be built. Additional machinery will be ordered. Address, Director of Co., E R. Marshall, M.P., St. Thomas.

St. Catharines, Ont

Tenders are called for store and flats to cost $5,000, King street, for John Alban Estate (Miss Alban). Architect, T. Wiley, St. Catharines. 2-storey, 30 x 70, stone and brick, stone foundation, felt and gravel roofing, hot water heating, gas and electric lighting, oak and cypress trimmings. Tenders received by architect, will close shortly.

Plans are being prepared for store and offices to cost $15,000, Queen street, for J. S. Campbell. Architect, T. Wiley. Three-storey, 35 x 70, stone and brick, stone foundation, steam heating, felt and

(Continued on page 70)

TURBINE PUMPS

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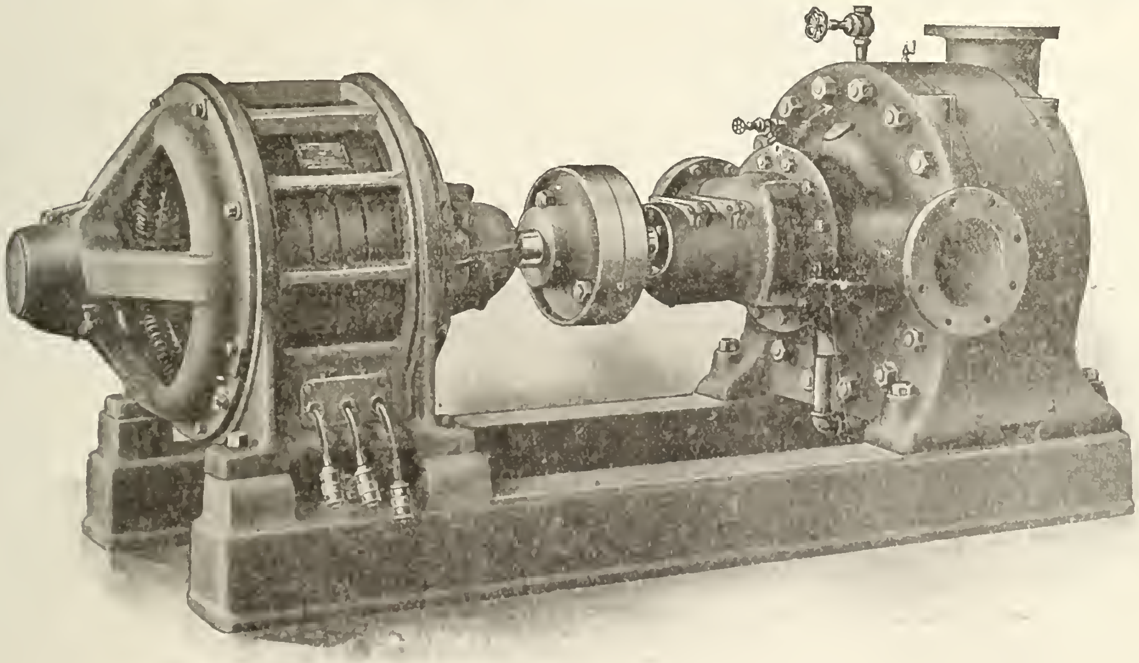

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TORONTO MONTREAL HALIFAX OTTAWA COBALT WINNIPEG CALGARY VANCOUVER NELSON

gravel roofing, gas and electric lighting, oak and ash interior finish, vaults, telephones, electrical work, boilers.

Tenders are open for Bakery to cost $7,000 on Geneva street, for J. D.Knight, St. Catharines. Concrete and brick, concrete foundation, hot air heating, maple floors, 2-storey, 35 x 100. Residence in connection. Tenders received by owner.

Tenders are called for extension to office to cost $3,000, King street, for United Gas Co. Ltd. Manager, P. J. Price, St. Catharines. Architect, A. E. Nicholson, 46 Queen street, St. Catharines. 3-storey, 16 x 28, brick and terra cotta, stone foundation, furnace, gas, felt and gravel roofing, pine interior finish. Received by A. E. Nicholson, St. Catharines until Feb. 15th.

St. Thomas, Ont.

Council are considering proposal to extend pipes of heating plant to supply down town stores and factories and also Collegiate Institute with steam heat. Cost $80,000. City Engineer, Mr. H. Baker.

Saskatoon, Sask.

Canadian Bank of Commerce are contemplating the erection of an addition to Bank to cost $50,000, 21st and 2nd ave. 3-storey, addition of 30 ft. floor space. Work will commence early in spring.

Strathcona, Alta.

Plans are being prepared for addition to Hotel to cost $25,000, Whyte Ave., for Commercial Hotel. Proprietor, Mr. Swaboda. Architects, Wilson & Herrald, Strathcona. Probably 4 storeys, brick.

Sketches are prepared for Business Block to cost $60,000, Whyte ave. west, for Jas. Watson & Co., Strathcona. Architects, Wilson & Herrald. 4-storey & basement, pressed brick and stone, ground floor fitted up for stores.

Tilbury, Ont.

Dominion Canners, Limited, Hamilton. Director, E. R. Marshall, M.P., St. Thomas. Local manager, Mr. Edgecombe, plan to erect an addition to their factory. Two-storeys, brick, 180 x 40, complete new corn packing plant will be equipped. It is stated work will start in the spring.

Tod Inlet, B.C.

Portland Cement Construction Company, branch of Associated Portland Cement Co. of England, are excavating for Cement Plant to cost $1,000,000. Work will be rushed on plant. The company will construct about thirty residences for employees.

Toronto, Ont.

J. Cassleman, 2243 Dundas street, is contemplating the erection of pair stores and residences to cost $6,000. 2-storeys, brick, tar and gravel roofing, store fronts.

Plans are completed for 3 stores and apartments to cost $6,000, corner Dundas and Bloor, for Wm. Davies Co., 521 Front street E., Toronto. 2-storey, brick, tar and gravel roofing, hot water heating, plate glass, plumbing.

Tenders are wanted for 3 attached stores and residences to cost $8,000, Balsam avenue and Queen street, for Harris & Lee, 41 Sinclair avenue, Toronto. Architect, Allen M. Taylor, 498 Queen st. west. 2-storey and basement, brick, cut stone, structural steel, galvanized iron cornice, tar and gravel roofing.

Work is in progress for store and dwellings to cost $5,500, 55 Ulster street, for Mr. Louis Weiss, 463 Manning Ave. Architect, Wm. Brown, 122 Garnet ave. 3-storey and attic, brick.

Tenders are open for factory to cost $28,000 on Dundas street, for General Fire Extinguisher Co., Mail Bldg. Architect, F. Herbert, 65 Adelaide street E. 3-storey, brick.

Plans are drawn for Machine Shop and Laboratory to cost $70,000 on Garrison Commons, for Ontario Government, Hydro-Electric, Continental Life Bldg. 2-storey, reinforced concrete, structural steel, cut or artificial stone, machinery, sky-lights.

Tenders are open for store and apartments, cost $18,000, Yonge near Bloor street, for Howard Blachford, 424 Markham street. Architects, Curry & Sparling, 90 Yonge street. 28 x 100, brick, tar and gravel roofing, hot water, gas and electric light, terra cotta front, sidewalk lights, hardwood finish and floors, plumbing, fire proofing.

A permit has been issued for garage, cost $6,000, n.s. Dundas street, for C. J. Powley, 66 Parkway ave. One storey, stone, tar and gravel roofing, cast iron columns.

Vancouver, B.C.

Plans are prepared for garage, cost $5,000, 622 Howe street, for J. H. Edmonds, vice-president Washington Trust & Savings Co., Seattle, Wash. Builder, E. K. Sheble, of Hansen & Sheble. One or two storeys, reinforced concrete, 25 x 120, galvanized iron, sheet metal.

Russell, Babcock & Rice, Metropolitan Bldg., are preparing plans for office building, cost $500,000, Hastings and Abbott streets. Private tenders called in February. Construction to start about May 1st, when present tenants vacate. Ten storeys, steel and concrete.

Plans will be ready in about a week for hotel, cost $50,000, Powell street. Architect, W. T. Whitney, Molsons Bank Bldg. Four storeys, brick and mill construction, 100 rooms, elevators, steam heating. Heating, plumbing and wiring let separately.

The Ford Motor Company of Canada are excavating for garage building, 1129-31 Howe street. Architect, J. J. Donellan, 319 Pender street, Vancouver. Steel and concrete. Plans are being prepared for two other similar garages.

Plans are prepared for store and office building, cost $85,000, Hastings street east. Architects, Parr & Fee, 370 Granville street, Vancouver. Eight storeys, steel and brick, 25 x 120. Tenders taken shortly from selected contractors.

Victoria, B.C.

Plans are being prepared for office building, cost $230,000, Fort & Douglas streets, for Dominion Trust Company, 328 Hastings street, Vancouver. Architect, H. S. Griffiths, 1006 Government street, Vancouver. Eight storeys, 50 x 65, steel and concrete. Work to commence in September on expiration of lease of building now on site.

Walkerville, Ont.

Tenders are called for gas motor factory for The Riverside Motor Company, Limited, Walkerville, Ont. Two stys., 30 x 60, brick, steel and concrete, prepared roofing. Firm manufactures stationery and marine gas motors.

Welland, Ont.

A site has just been purchased for erection of a 2-storey business block, E. Main street, for A. J. Morris, Guelph.

Windsor, Ont.

Tenders will be called for addition to laboratory, cost $25,000, on Sandwich st. Owner, Frederick Stearns & Co., Windsor. Supt., G. A. Smith. Architects, Crane & Pennington, Windsor. Three storeys and basement, 120 x 48, mill construction, brick, electric lighting, prepared roofing, sprinkler system, motors, freight elevator, printing presses. Received by architects about March 1st.

Winnipeg, Man.

Foundations are started for extensions to store, Portage ave., Donald & Hargrave, for T. Eaton Co., Toronto and Winnipeg; vice-president, H. McGee. Entire structure to be made nine stys.; area of floor space increased to about two acres; five new passenger elevators and several large freight.

CONTRACTS AWARDED

Calgary, Alta.

Office, cost $5,000, for C. D. Vinniers, 616 14th ave. west, Calgary. General contractor, Christie & Co., 18th avenue west. One storey, 25 x 80, brick, concrete foundation, electric lighting, tar and gravel roofing.

Montreal, Que.

Offices, probable cost $67,000, Notre Dame street, for J. O. Gravel, 71 St. James street. Architect, Hutcheson, Wood & Miller, Royal Insurance Bldg. General contractor, C. E. Deakin, 12 St. Sacrament street. Sandstone and concrete, terra cotta and steel, concrete foundation, steam heating, electric and gas lighting, gravel roofing, fireproof throughout, marble finish, hose cocks on each floor.

Ottawa, Ont.

Concrete work is under way for garage, cost $9,000, for L. Duhamel & Co., Ottawa. Architect, J. P. McLaren, 104 Sparks street. Genereal Contractor, A. O. Garvock, Lewis street, Ottawa. 66x65.

Strathroy, Ont.

Extension to canning factory, cost $10,000, for Strathroy Canning Co. (Dominion Canners, Ltd.), Hamilton. Manager, Thos. Dunn. Contractor, George McBeth, Strathroy. Four storeys, brick.

Toronto, Ont.

Addition to head office, cost $10,000, Richmond and Yonge streets, for Confederation Life Association. Architect, J. Wilson Gray, Confederation Life Bldg. Builder, Brown & Love, Price st. Glazed brick, mosaic tile, terra cotta, skylights, metal sash, plumbing, galvanized iron cornice, ornamental iron.

Garage and store, cost $13,000, N.E. Cor. Victoria and Shuter streets, for Harry Ryrie, Yonge and Temperance streets. Architects, Burke, Horwood & White, 28 Toronto street. Builder, Witchall & Son, 163 Havelock street. Two storeys, brick, tar and gravel roofing, steam heating, structural steel, skylights, cut stone, Ohio or Indiana, plumbing, hardwood finish, reinforced floors, metal lath, plate and art glass, galvanized iron cornice, freight elevators.

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CATALOG?

It's a beauty, and the largest and best catalog of

Hoisting Machinery

ever published in Canada.

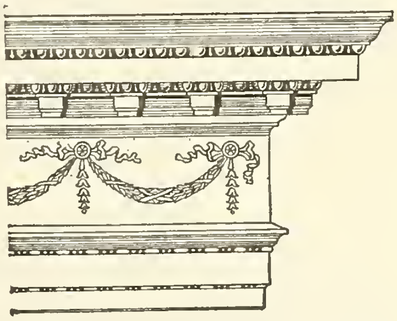
And why should it not be the Best Catalog, for does it not describe the Best Hoisting Machinery made in Canada?

This book also shows a splendid assortment of Derricks and Derrick Parts, Steel Buckets, Steel Skips and Steel Cars, and many other articles used in connection with Hoisting Machinery.

If you are interested in these goods drop us a line, so we may mail you one of these fine catalogues. You will not be sorry.

Marsh & Henthorn, Limited
Belleville, Ont.
Makers of Hoisting Machinery
Sales Agents: MUSSENS Limited, Montreal

Galvanized Cornices



Our catalogue of galvanized cornices will aid you to decide on a suitable style of cornice for any job.

Gladly sent, together with price list, to any architect or builder. Special cornices made to any detail.

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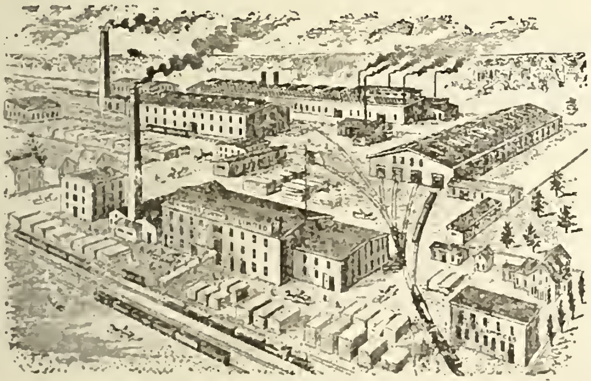

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In addition to our large stock of native lumber, we are now carrying about one million feet of foreign lumber, including oak, walnut, ebony, whitewood, basswood, red cedar, Douglas fir, mahogany, &c.

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BRANCHES AT
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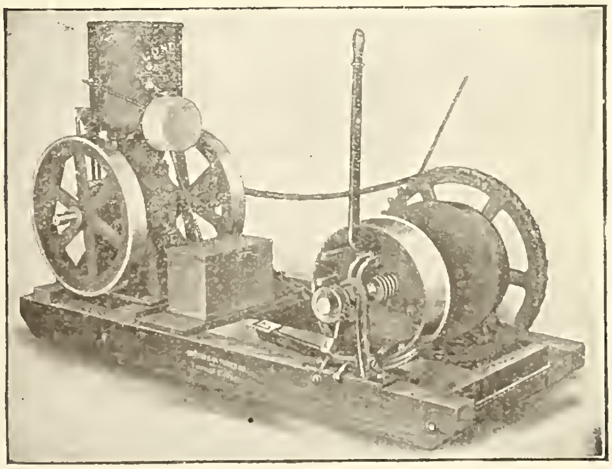
Do You Want a Good Hoist?



PATENT APPLIED FOR

"London" Friction Clutch Hoist

Here are a few of its many uses

Contractor's Work	Mortar Conveying	Well Digging
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This hoist can be used with any make or style of gas, gasoline or oil engine

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Canada Used Almost 8 Million Dollars Worth of Clay Products Building Materials in 1910

More than 1-3 the cost of all the structural materials used in Canada that year was represented in clay products—brick, tile and sewer pipe.

Next month the manufacturers of clay products will give an international exposition of their work, March 7th to 12th inclusive, in the Coliseum, Chicago. The exhibits will range from the most delicate porcelain to the strongest gas tight sewage tight sanitary vitrified sewer pipe. A full size brick paved street will be shown, with sewer construction under way, illustrating every detail of the work from the tile bath room to the house connections, man holes, trenching, bracing and sheeting, pipe laying and connection with the main sewer.

To the engineer, contractor or city officer who has to do with building or sanitation a visit to the Clay Products exposition will be of certain profit. Make your plans now for Chicago March, 7th to 12th.

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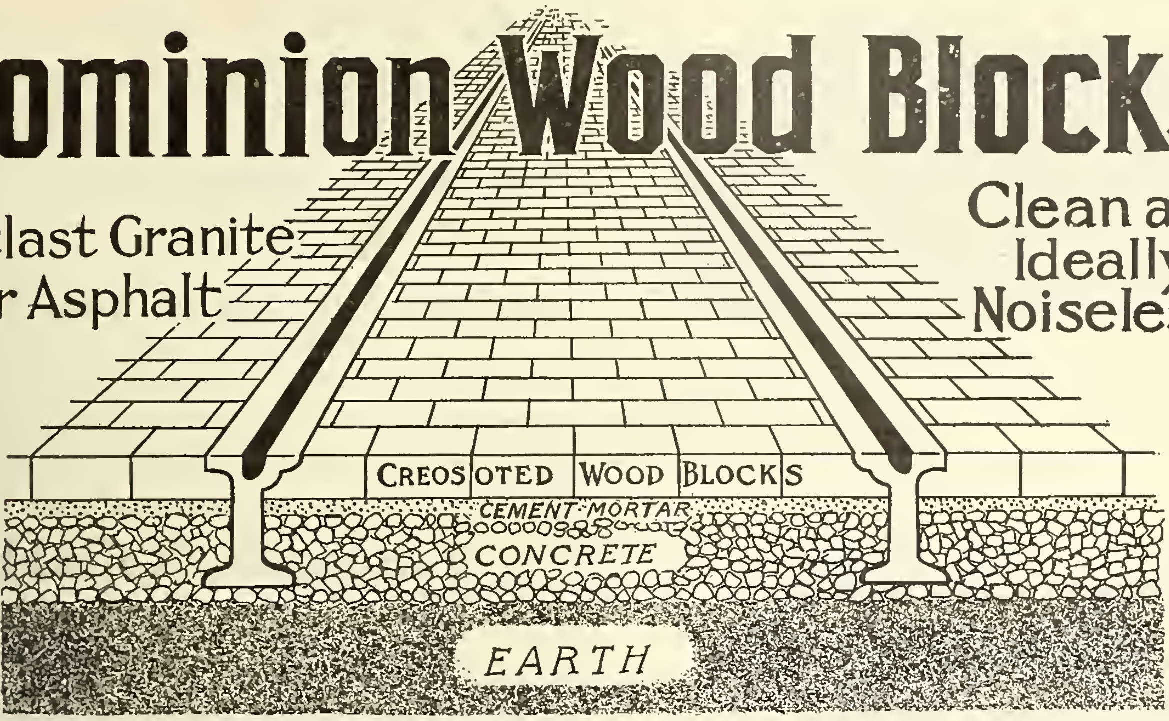
Colisem, Chicago, March 7-12, Inclusive.

Dominion Wood Blocks

Outlast Granite or Asphalt

Clean and Ideally Noiseless



The Proof of the Pudding

May be in the eating; which seems also to suggest ease of early dissolution. The exact reverse applies to the PROOF OF A

Permanent Pavement

One that requires the constant attention of the Repair Gang to prevent its break-up and ruin could not be said to have proven satisfactory. Yet the Repair Gang seems to be an essential feature of Patent Pavements. ¶ How often have you seen the **Creosoted Wood Blocks, The Wood Eternal,** being PROVED IN THE PUDDING MANNER? ¶ Dominion Creosoted Wood Paving Blocks are cut from the log of live Douglas Fir in our own mills.

Dominion Creosoting Company

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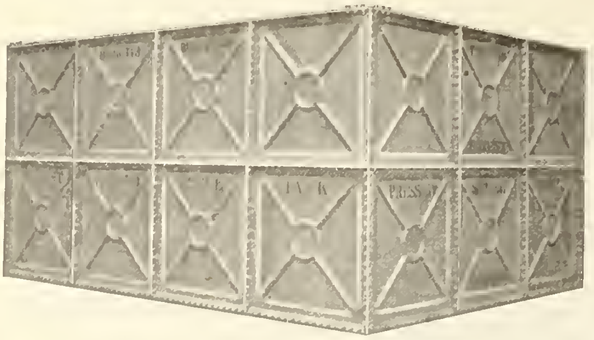

Capacity, 9600 Galls. Size, 16 x 12 x 8 ft. deep.

Patent Pressed Steel Tanks

are built up of plates 4 ft. square by 5/16th in. thick. There are only three types of plates and all are interchangeable. Easily erected by unskilled labor.

LIGHT. STRONG. CHEAP. UNBREAKABLE.

IMMEDIATE DELIVERY FROM STOCK.

STEEL PIPES—Welded or Rivetted

of any diameter over 12 inches and having any desired type of joint.

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should be advertised for in the CONTRACT RECORD "Tenders and For Sale Department." This paper is the "Tender Ad." medium of Canada and always brings bids from the reliable contractors and supply houses.

File your plans for any work you are inviting bids on, in our offices at Toronto, Montreal, Winnipeg or Vancouver.

Contract Record
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Johnson's Reliable Veterinary Remedies

will give you better satisfaction for less money than any other preparations on the market. They are being used by most of the large horse owners throughout Canada—particularly by the Lumbermen and Railway Contractors.

The lines that are selling best are:

Johnson's Horse Liniment, No. 1 (Alcoholic)

1 gal. jugs (Imperial)	$4.50 gal.
1 lb. bottles	8.00 doz.
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Positively the best all round Horse Liniment made.

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Johnson's Horse Colic Remedy

A sure and speedy cure for all kinds of Colic

1 gal. jugs (Imperial) 40 doses	5.00 gal.
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2 lb. tins	2.00 per tin
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1 lb. packages	3.60 doz.

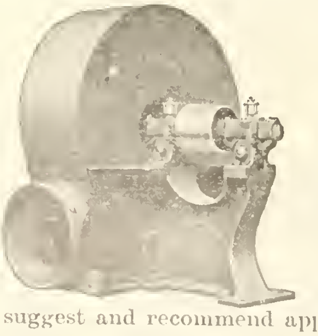
A full supply of all drugs and patent medicines at lowest wholesale prices.

Have you ever used for your men

Johnson's Mosquito Oil 1.75 doz., 18.00 per gross
It positively does the trick

Our prices are lower than those of all other manufacturers. Letter orders receive prompt attention.

A. H. Johnson, Wholesale Druggist, **Collingwood, Ont.**



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Stock Fans

Embrace such a diversity of types and sizes that nearly any ordinary conditions of fan engineering may be met by a fan shipped from stock.

Spare parts always ready for immediate shipment.

STURTEVANT Engineers suggest and recommend apparatus to meet requirements.

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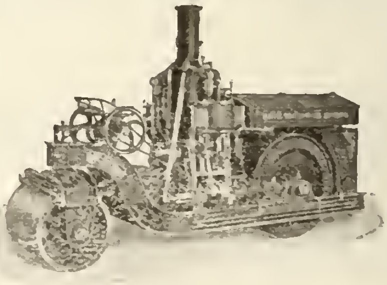

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Send for our Catalogue of Asphalt Rollers and Mixers.

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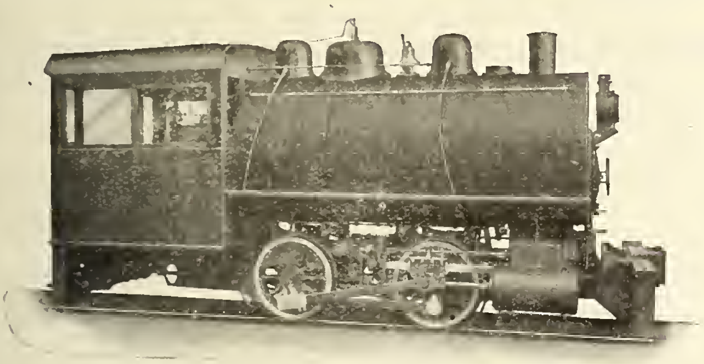

Persistent specialization, careful testing of all materials, and painstaking care in manufacturing, have produced our standard locomotives for contractors, quarries, and switching around mines and industrial plants.

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Spare parts that are sure to fit are always on hand for prompt shipment.

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BANK OF OTTAWA BUILDING, MONTREAL, CANADA

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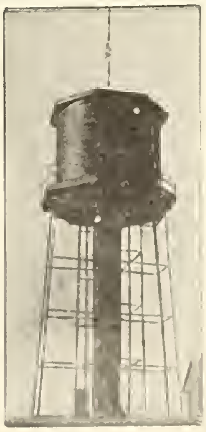

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Steel Substructures of all kinds
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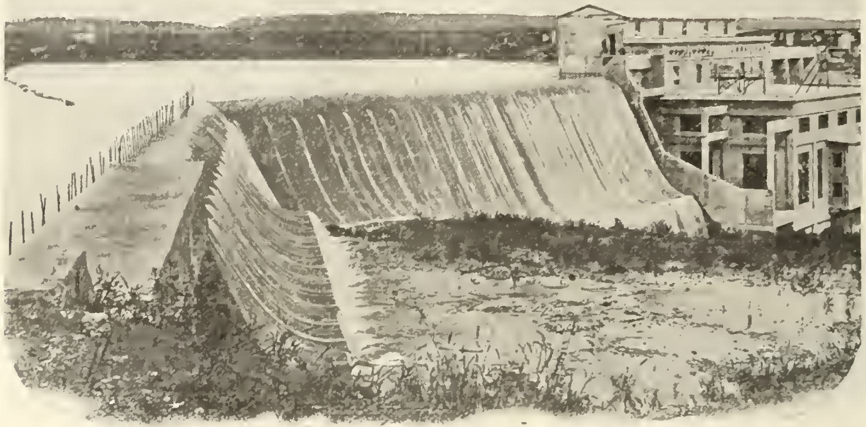

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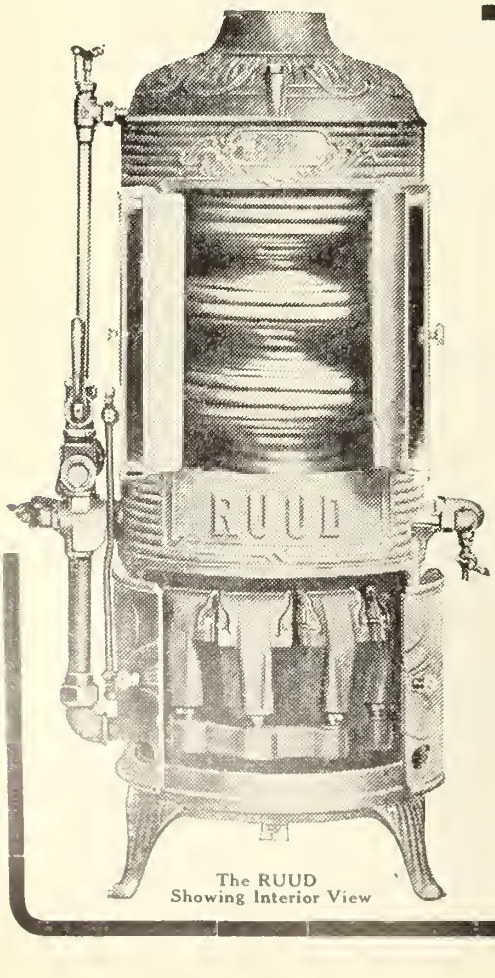

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Showing Interior View

Thousands of Architects

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Instantaneous

Gas Water Heater

One installed in the cellar means hot water for everybody in the household at any time and all the time. Not only that, but all you have to do is just turn the hot water faucet. There is nothing to light or put out—no waiting for water to heat. Opening the faucet lights the gas in the RUUD and closing the faucet turns off the gas. The supply is inexhaustible, because the water is heated **as it flows.** There is a RUUD in operation at our salesroom .It will interest you if you come in and see it work. 12 and 14 Adelaide St. W., or send for representative. 700 now in use in Toronto.

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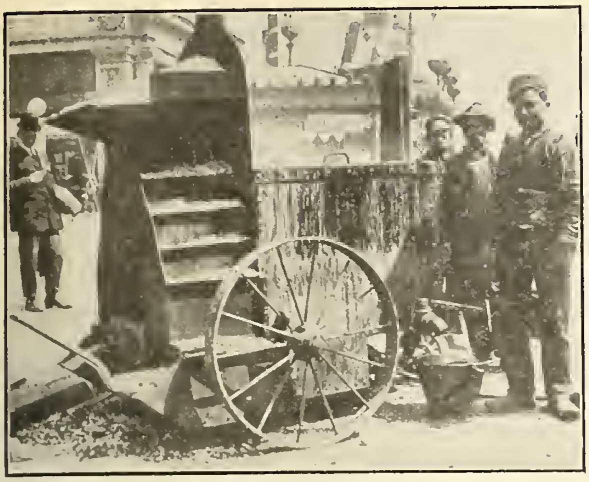
Telephone Main 1933 Main 707 Main 4142



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A Money Maker for Contractors

Is on wheels and can be easily moved about. Supplies hot gravel and hot tar from the one fire.

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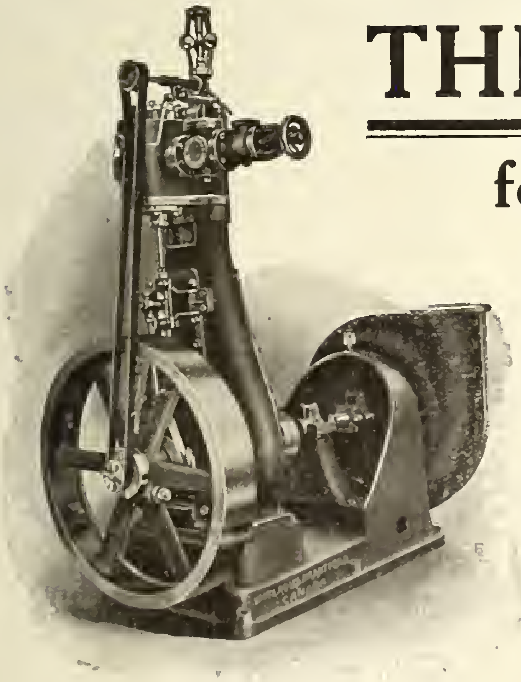

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for the General Contractor

In this pump and engine we offer a pumping outfit that for simplicity, strength and general efficiency cannot be bettered.

The pump section is our standard pump design with reversible runner, rim split shell, bronze packing gland and split base. The engine, direct connected to pump, is a vertical high-speed single crank type, entirely enclosed and self oiling, fitted with "Sweet" balanced and double-ported slide valves and built on duplicate part system.

Simple to install and to operate this pump unit requires small space and can be depended upon to work full shift day after day with little attention other than occasional overhauling for cleaning and lubrication. Built in nine pump sizes, from 4-in. to 14-in. diameter discharge opening.

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Note tremendous metal weight on this floor. Entire building of Alsen's Cement reinforced concrete

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
45 BROADWAY, NEW YORK

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Put on a wall two sheets of lath, one the ordinary kind and one of Herringbone. Mix your plaster too wet and without sufficient hair. By varying your mix you will easily find a plaster which will drop badly from the back of the ordinary lath but will not drop from the Herringbone.

Herringbone Lath gives the best key

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Merriman One-Car Asphalt Plant

The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.

Many special features. Write for full particulars.

Also Asphalt Mixers

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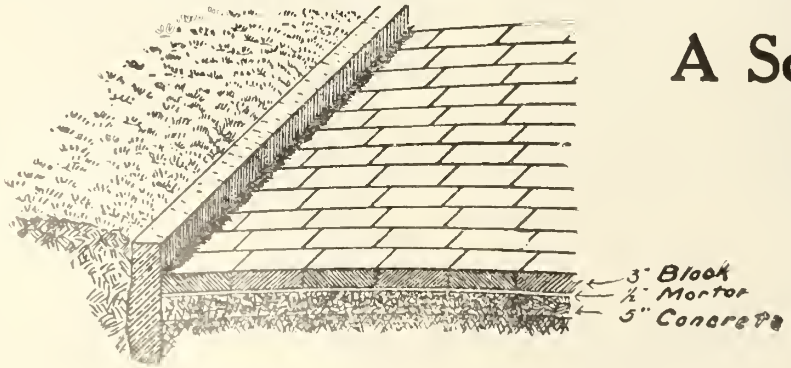

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must be

Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by

Asphalt Block Pavements

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The Ontario Asphalt Block Company, Limited - Windsor, Ont.

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**Used by the Largest Mining Companies and Hydro-Electric Plants.
Also Extensively for Dredging, Exhaust Steam, Compressed Air, etc.**

Sizes 3 to 42″ Diameter up to ¼″ in thickness
Easily installed and securely connected with our Forged Steel Flanges or All Steel Bolted Joints.

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Crushed Stone

All sizes. For Roadways and Sidewalks also specially adapted for

Reinforced Concrete Construction

Our arrangement with C.P.R. to have our stone brought to Toronto DAILY by SPECIAL TRAIN makes our DELIVERIES promptest possible.

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Christie, Henderson & Co.
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A Stucco or concrete house needs protection with the original

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BRICK AND CEMENT COATING

The coating prevents discoloration or cracking from moisture and does not destroy the pleasing texture of the concrete or stucco. It has been endorsed by the National Board of Fire Underwriters as a fire retarder and is a perfect protection as well as a beautiful tint for the exteriors or interiors of residences, hotels, garages, factories and mills.
ON FLOORS it stands wear and washing and does not disintegrate. Let us send you a book which tells all about it and a list of the well known homes, hotels, mills and factories on which it has been used. Address, mentioning this medium.

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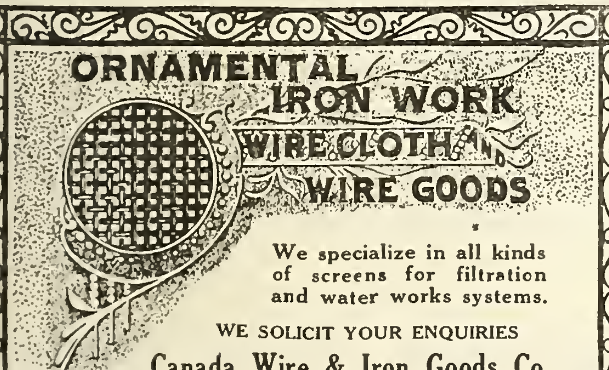

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have been used and approved by nearly all leading Engineers. They are undoubtedly the most economical means of storing water at an elevation.
We have built many of these in Canada the United States and Mexico.
Estimates cheerfully furnished.

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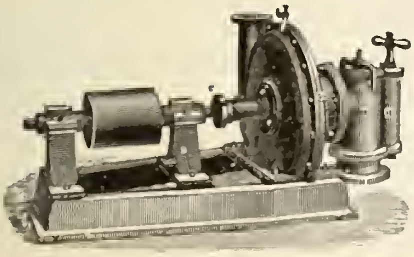
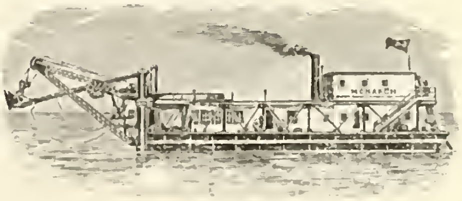


Steel Dump and Deck Scows

Submarine Rock Drilling Machinery
Mine Hoists, Hoisting Engines
Centrifugal Pumps, Clam Buckets
Steel Skips, Coal and Concrete Tubs
and other Contractors' Machinery.



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FOR
Municipal and Private Water Supply
Direct Pumping or Gravity Systems
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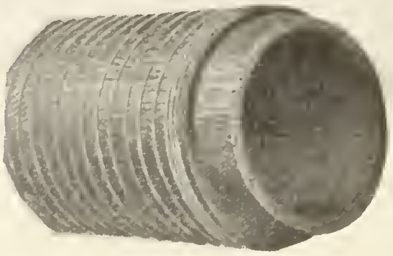
WILL NOT
Rust, Rot, Burst, Freeze or Taint



Withstands 200 lbs. Working Pressure
Unaffected by Acids or Minerals

Tanks, Water Works Supplies, Complete Water Systems Installed

WRITE US:

The EASTERN PIPE AND CONSTRUCTION COMPANY, LIMITED, Alexandria, Ontario

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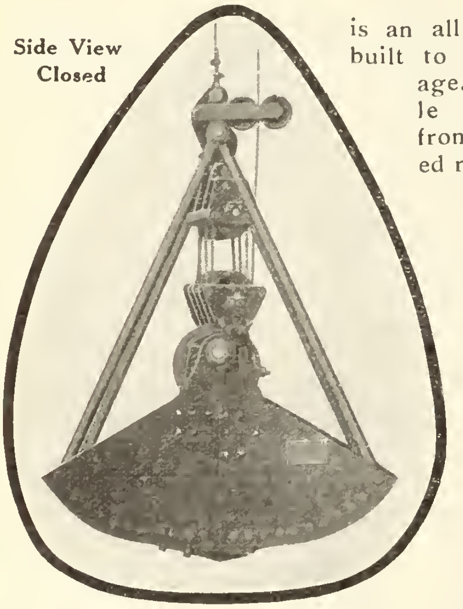
The

Owen Bucket



is an all round bucket, built to stand hard usage. It will handle any material from sand to crushed rock.

The Owen Bucket will dig like a steam shovel and is provided with detachable teeth for dredging.

Write for our catalogue fully descriptive and a positive guarantee with every bucket.

The Owen Bucket Company
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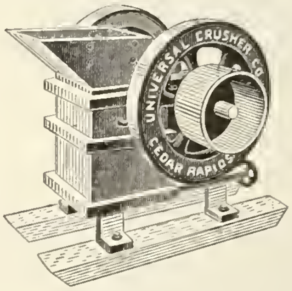
The Universal Crusher

Because of its Forced Feed and Forced Discharge the Universal is SUPERIOR FOR FINE AND UNIFORM CRUSHING To Any Other Machine in the World.



The Famous
Forced Feed Crusher
Made in All Sizes

Instantly adjustable to crush to any size, from 3 in. down to ¼ in. and finer. Enables you to make any size material at once without the expense of handling over-size or under-size.

The forced feed action gives a maximum capacity, using **half the power** of other makes.

GUARANTEE

30 day's trial to your heart's content **on any material.** If it should fail to do the work as agreed, your money cheerfully refunded. If you can suggest any fairer proposition, tell us what it is.

The Universal Will Save You Hundreds of Dollars

Write for particulars to

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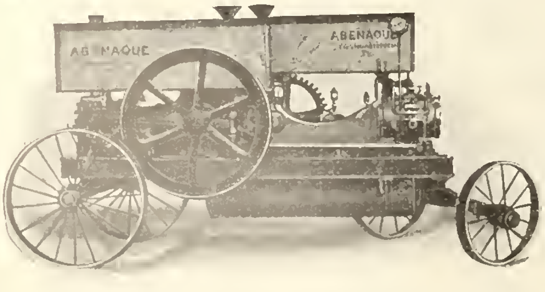
$ You Can Save $100 a Day on Many Jobs $



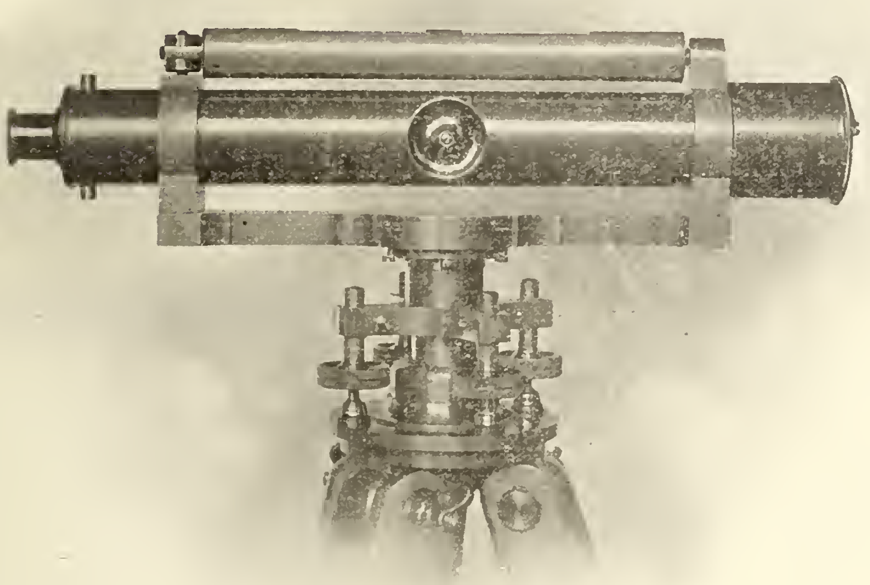
"Can You Use the Money"

ABENAQUE
PORTABLE AIR COMPRESSOR OUTFIT

is saving money for every contractor using it. Why not let it do the same for you? Let us talk with you regarding the cost of handling your work with one of our outfits.

Write for Catalogue M

ABENAQUE MACHINE WORKS,
Westminster Station, VERMONT.



The Consol Level

For exactness in construction and superiority of the working and optical parts, the Consol Level meets all requirements.

Our many years experience as manufacturers of Scientific Optical Instruments gives us exceptional training and facilities for designing and constructing Transits and Levels of high order.

Consol Instruments are made in our Factory at 400 Richmond Street West, Toronto by the most skilled instrument makers we can procure.

The entire instruments and their optical parts are built up here from raw material, no imported parts being used, reducing their cost by the amount of the duty paid on Imported Instruments.

We give you a Canadian Instrument at a Canadian price because

WE SAVE THE DUTY

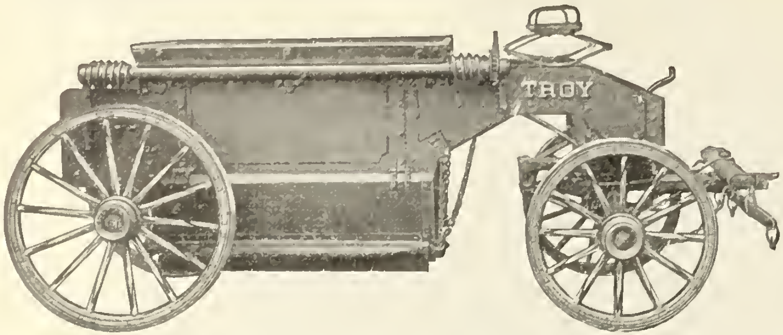
An invitation is extended to those interested to visit our Factory, where Scientific Instruments and Lenses in all stages of manufacture may be examined.

Write for Illustrations of our Instruments.

Consolated Optical Co., Limited - Toronto

MONTREAL WINNIPEG CALGARY VANCOUVER

January 1st — Resolution Day


Troy Bottom Dump Wagon, New Model

Resolve to do your hauling cheaper than you did last year.

Use TROY Specials and get your costs down to rock bottom. Your teams can make more trips—the Special is lighter running. Your men can load it quicker—it's lower down. And it never can get out of order. The price is **Right.**

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They will sell you Quarry Blocks, Sawn Marble, Marble completely finished for either interior or exterior purposes, and, if necessary, they will contract to set it in place.

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General Contractors Supply Company, Ltd.	Halifax, N. S.
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James Robertson Co. Ltd.	St. John, N. B.
G. R. Duncan	Fort William, Ont.
Walker & Barnes	Edmonton, Alta.
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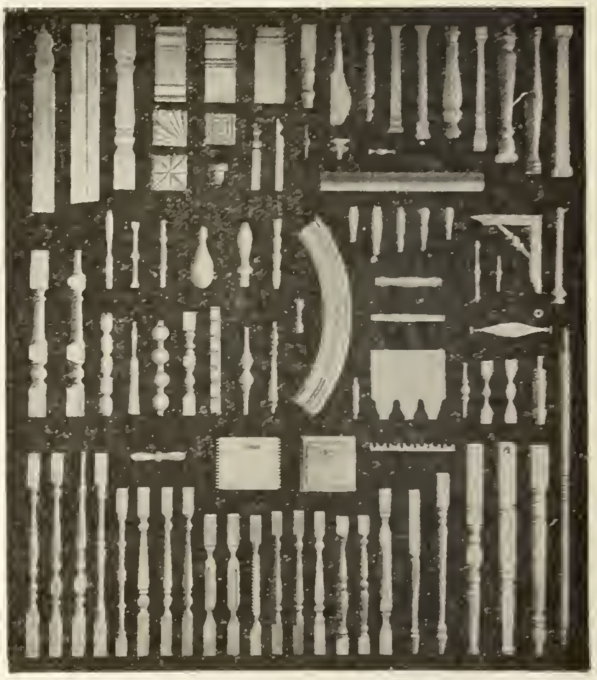

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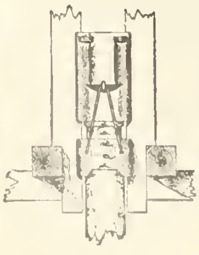
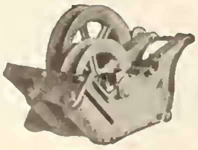

Casgrain Pile Cap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No COST FOR MAINTENANCE if you use our Enameled Brick.

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Concrete Reinforcing Flat

The immense tensile strength of steel wire, far superior to steel bar, gives a large bonding contact per lineal foot of section, and fully distributes the reinforcing, to match the load.

Page Wire Reinforcing is this type at its best. To be had in flat sheets in lengths to order. No difficulty in laying. All wires in direct tension.

Architects and Contractors will benefit from the use of flat wire reinforcing. It results in better bonding, increased strength, saved freight, and quicker work. Specify Page Wire Reinforcing.

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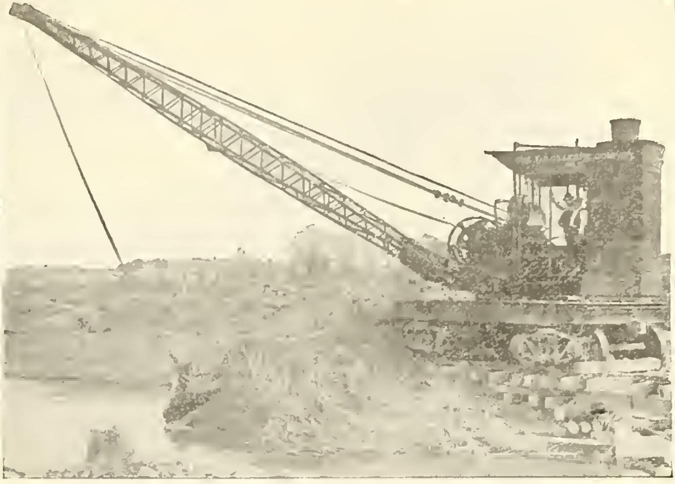
St. John, N. B., 37 Dock St.



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Locomotive Cranes on Construction Work

The one shown here is working on the New York State Barge Canal equipped with a scraper bucket. These cranes are used from the beginning to the end of a construction job. They do the excavating with any style bucket; drive the piling; deposit all concrete both to elevated forms and to trenches; handle the sand, gravel, crushed stone, heavy timbers and steel sections; and switch the cars.

These different operations are shown in our new illustrated catalog. Write for it to-day. It is free.

The Brown Hoisting Machinery Co.
CLEVELAND, OHIO

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REDS--BUFF--STONE--GREY

and all Colors, Glazed and Unglazed

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The Toronto Plate Glass Importing Co.
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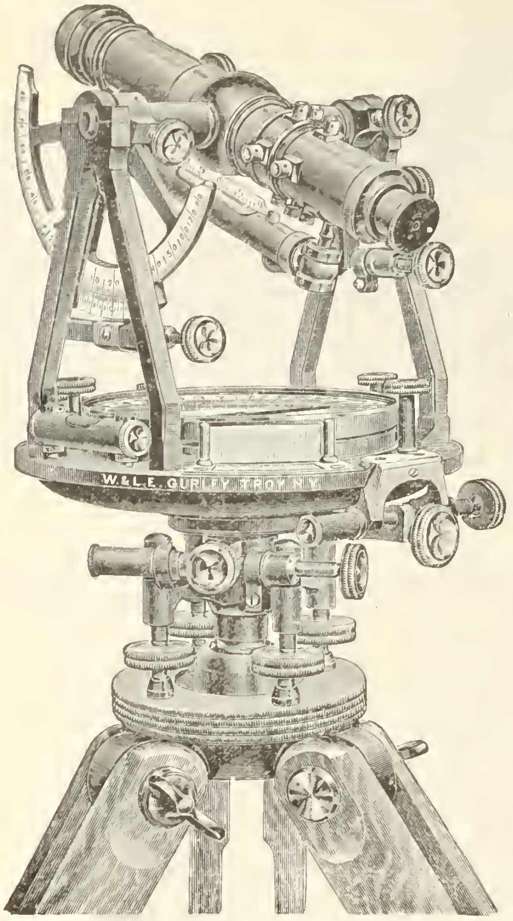
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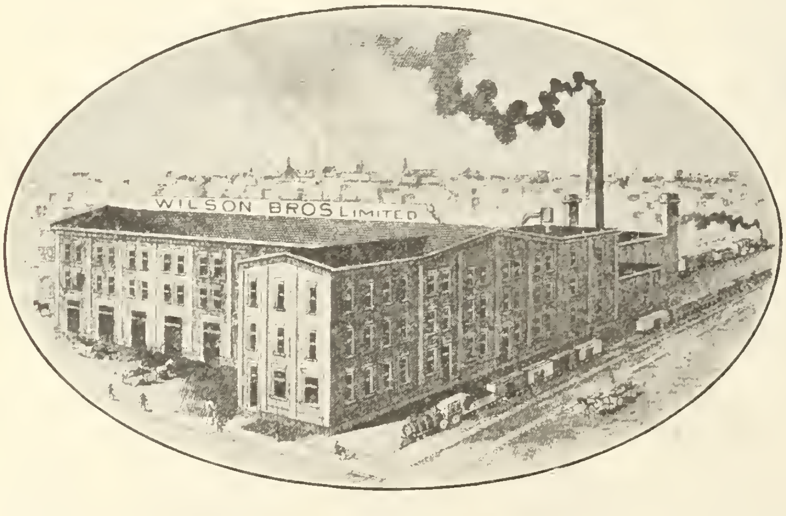

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Also called, by some manufacturers, Railroad Level. A good Wye Level, of the same construction as an engineer's level, but at a medium price. In this level, we believe we have one that will answer to the above in every way. We consider this style of level superior to the Dumpy, as, by having the Wyes adjustable, the operator can turn the telescope in its own bearings and reverse the same, end for end in the Wyes, and take the mean average of different readings, thus checking his work from one location. Constructed of phosphor bronze and bell metal which combines both strength and lightness.

Surveyors' Y Level, achromatic telescope 16 inch; magnifying power 38 diameters, with dust guards, sun shade and dust cap; objective 1¼ inch, with rack and pinion movement, eye-piece adjustable for focusing cross-hairs, graduated level vial, 6 inch, adjustable; telescope is provided with a stop to insure true vertical and horizontal positions of the cross-hairs, and rests in two strong wyes, one of which is adjustable. Four leveling screws, clam and tangent screws with compensating springs. Weight of instrument without tripod, 7½ lbs. Instrument complete in mahogany finished box, with solid leg tripod. Each, **$95.00.**

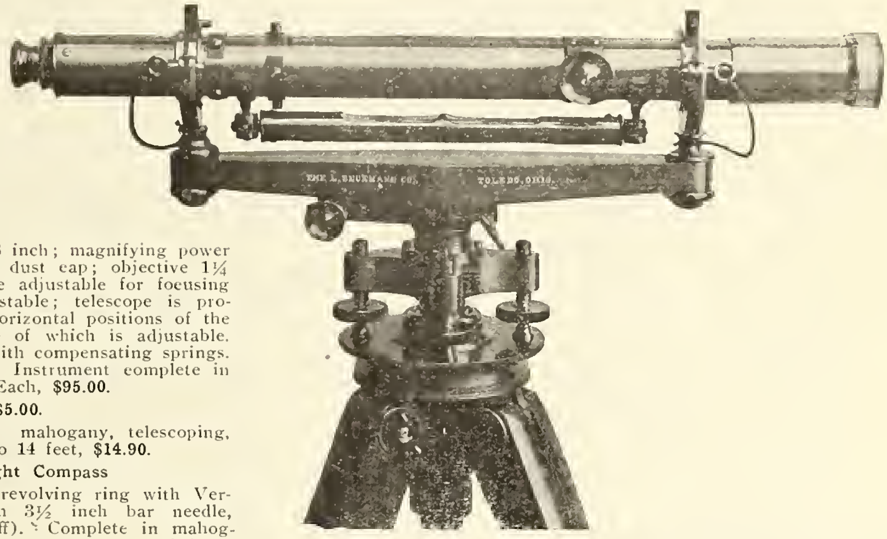
Split leg tripod in place of regular, extra, **$5.00.**

English Self Reading Leveling Rod.—Of mahogany, telescoping, strong brass mounting, 5 feet long, sliding out to 14 feet, **$14.90.**

Short & Mason Surveying and Sight Compass

Surveying compass with folding sights on revolving ring with Vernier and Scale for magnetic variations, with 3½ inch bar needle, jewelled, ball and socket mounting (Jacob Staff). Complete in mahogany case, **$18.00.**

Optical Department, Second Floor, Albert Street



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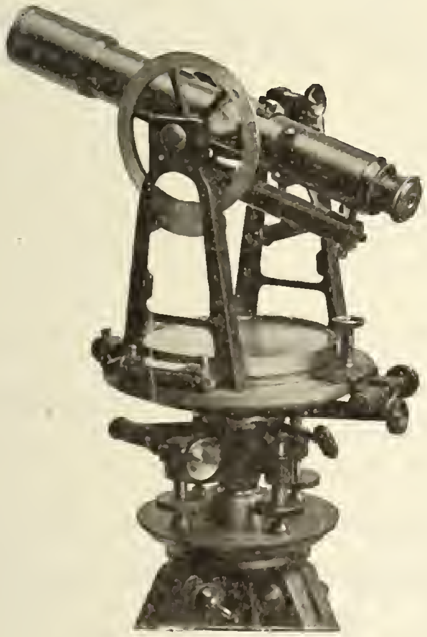

No. 22

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Manufacturers of Up-to-Date Surveyors, Engineers, Contractors Instruments

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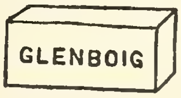
Everlasting

Building Brick



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SCREENED SAND AND GRAVEL

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Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per B
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 '	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.50	$ 6.75	$ 5.25
40 u. i.	4.25	3.75	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts—Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 per cent.

No. 4 compression bath cock	net $1.75
No. 4½ Fuller's	net $2.35

Square head brass cocks, 65; iron, 65 per cent.

Boilers—Galvanized Iron Range

30-gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5¼ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)	Black.		Galvanized
¼ inch	1.80	¼ inch	2.57
⅜ "	1.80	⅜ "	2.57
½ "	2.35	½ "	3.23
¾ "	2.75	¾ "	3.83
1 "	3.93	1 "	5.48
1¼ "	5.35	1¼ "	7.49
1½ "	6.44	1½ "	8.98
2 "	8.05	2 "	11.46
2½ "	12.85	2½ "	18.30
3 "	16.86	3 "	24.03
3½ "	22.57	3½ "	33.65
4 "	25.65	4 "	35.90

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-nch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

Crushed stone, 2-inch, $1.30; 1-inch, $1.30; ⅜-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and leads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

Scotch fire brick, delivered. $30 to $35 per M.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded. $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $3.00.

Manilla Rope, best, per pound, 16½ cents.

PAINTS AND OILS

(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $6.75 to $7.00 per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, 99c. per gallon of 9 lbs.

Raw Linseed Oil, in barrels, 96c. per gallon of 9 lbs.

Turpentine, in barrels, 73c. per gallon.

Pure Red Lead, dry, $5.50 to $6.50 per 100 lbs.

Business Notes

Fredericton, N.B.

Business building belonging to Sharkey Estate burned. Tenants, Western Union Telegraph office. S. F. Wilkes, confectionery; Singer Sewing Machine office. Damage estimated at $10,000. Building will be rebuilt at once.

Kenora, Man.

On the 19th inst. fire destroyed the following: fire hall, police station, $12,000; Block, $5,000; plumber's store, $1,000.

Montreal, Que.

Sash and door factory on Simard ave. belonging to Joseph St. Louis, destroyed by fire, Jan. 18. Loss about $4,000.

An explosion followed by fire damaged the plant of Wire & Cable Co., Guy street, on Jan. 23 to the extent of $4,000.

Ottawa, Ont.

The recommendation of Board of Control re purchase of motor propelled fire engine to cost $11,000, will probably be passed by council. Tenders will then be called immediately.

St. Jacques L'Achigan, Que.

On 19th inst. fire destroyed the main portion 50 x 80, of the 3-storey stone convent. The church near by was also damaged. Total loss $45,000, covered by insurance.

St. Mary's, Ont.

Wood-working factory of St. Mary's Specialty Co. burned. Damage amounting to about $20,000.

Toronto, Ont.

Blasford & Treloir's foundry at 388-400 Front street east, burned. Loss estimated at $8,000.

Winnipeg, Man.

Cold storage building on Jarvis ave. and Salter street, belonging to Chechiek, Gold & Kernahan, burned. Damage amounting to $100,000, mostly confined to contents. Partitions and top floor suffered most.

Established 1882
THE COMMERCIAL
The WEEKLY FINANCIAL, COMMERCIAL & GENERAL TRADE NEWSPAPER of the GREAT WEST
WINNIPEG

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Locomotive cranes, clam shell buckets, hoisting engines. steam shovel. pile driver, steam hammer. diving suits, stiff leg derricks. turnover buckets, two (2) marine engines, boilers, fuel lighter with whirley aboard. Address

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Contracts taken in any part of Canada. Several years experience in Artesian Wells for Municipal Water Works. Estimates or geological information cheerfully furnished.
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of all designs in both iron and steel; Roofs, Telephone Poles, House Girders and all kinds of Structural Iron Work.

Our stock in hand comprises Steel Beams, Angles, Tees, Channels, Plates, Rolled Edged Flats, Bars, Rivets, Rounds, &c.; Iron Beams, Bars, Squares, Turnbuckles, Rivets, &c.

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Canadian Offices:
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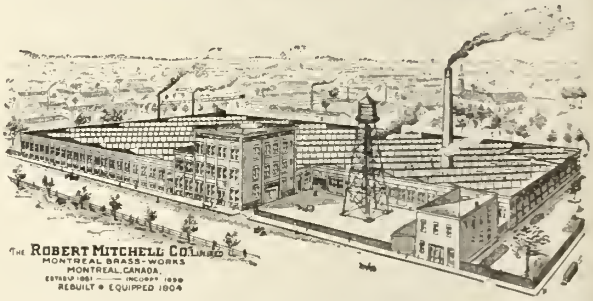
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Boilers of all kinds.

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High-Grade German Brands for Granolithic and Artificial Stone Sidewalks. SEWER PIPES, CULVERT PIPES, etc. Best English Cements. Best Belgian Cement.
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Galvanized Wire Wound and Continuous Stave Pipe for Waterworks, Power, Irrigation, etc.

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WITHSTANDS 250 lbs. WORKING PRESSURE. Prompt attention to inquiries; write for prices.

The Canadian Pipe Co, Limited, Vancouver, B. C.

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Toronto Offices - 12 QUEEN STREET E.

A Great Favorite

The man who knows a good thing when he sees it, and who wants a good thing when he hears of it, is the man who will insist upon having

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Architects and contractors who cater to this class of men will be acting directly in their own interests by specifying this brand

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Flexible and Flange Pipe, Special Castings and all kinds of Waterworks Supplies.

3 inches to 60 inches diameter

for Water, Gas, Culvert and Sewer

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Iron Ore, Pig Iron, Car Wheels, Cast Iron Water and Gas Pipe, Specials, Valves, Hydrants, etc., Castings of all kinds, Mooring Bollards for both Concrete and Wooden Docks, Hoisting Machinery.

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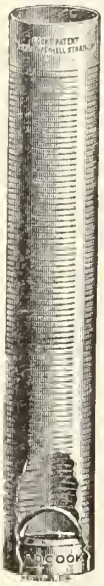

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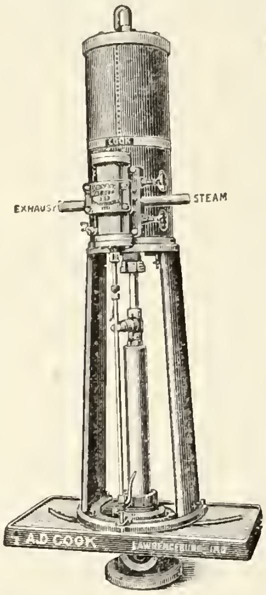

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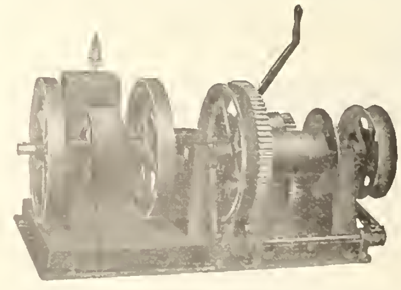

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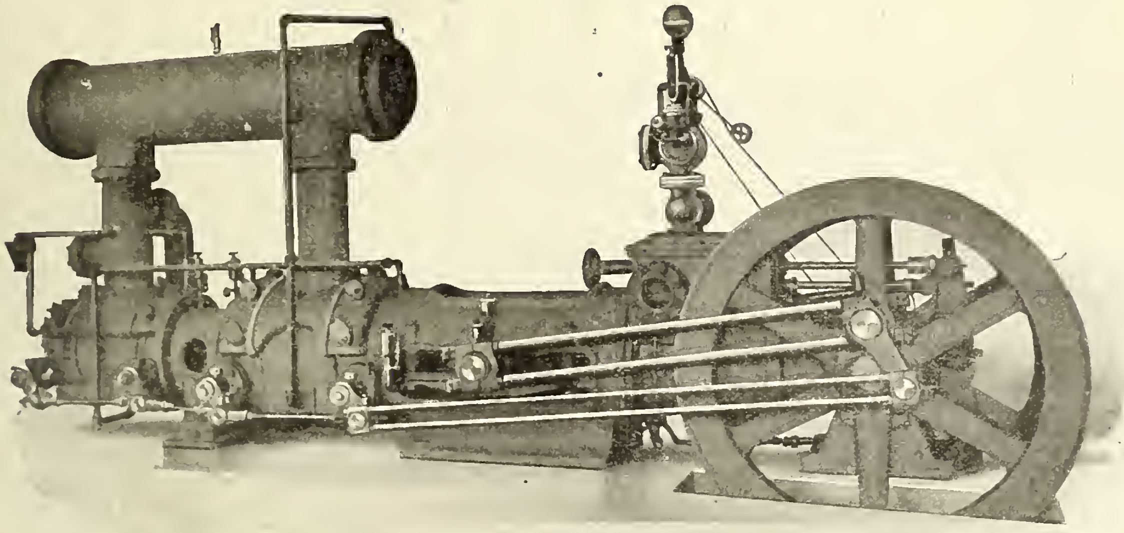

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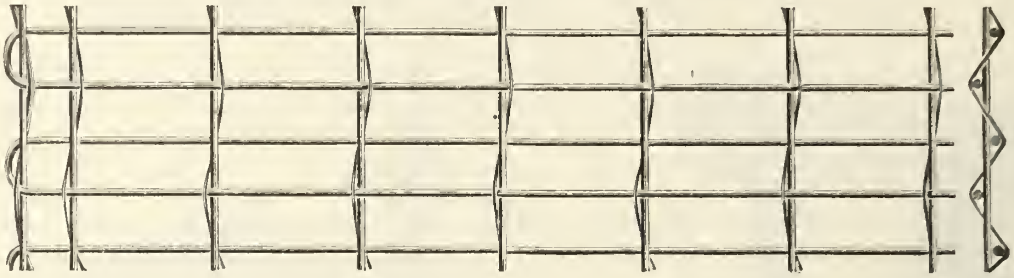

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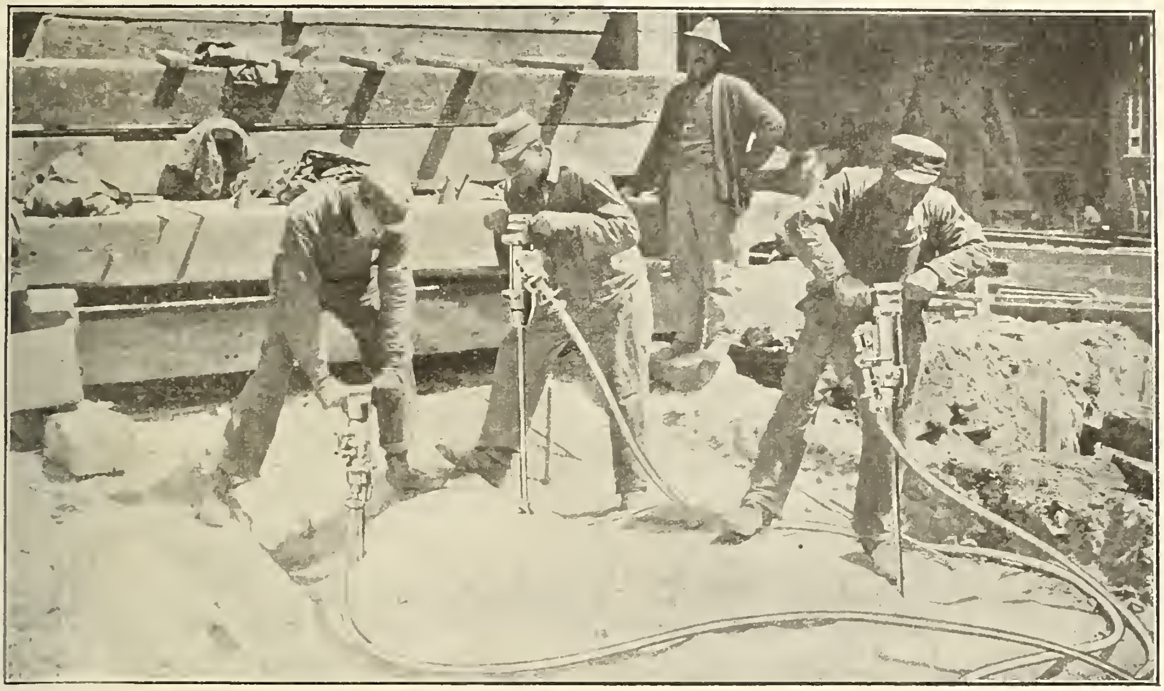

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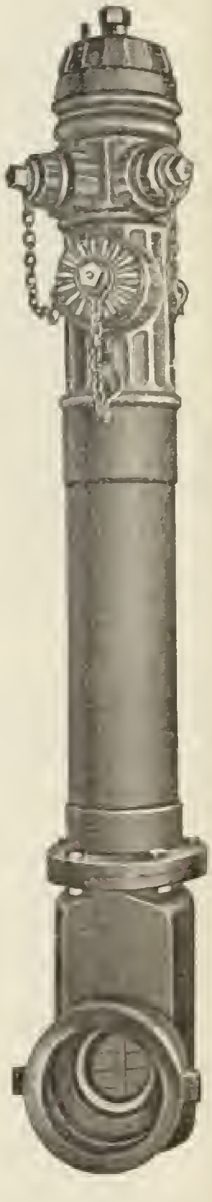

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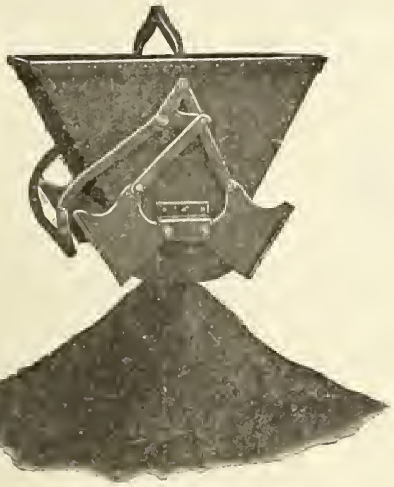

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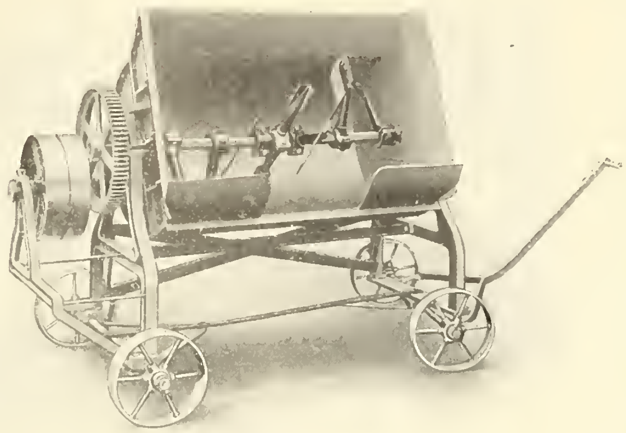

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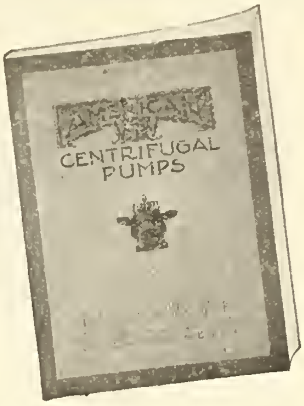

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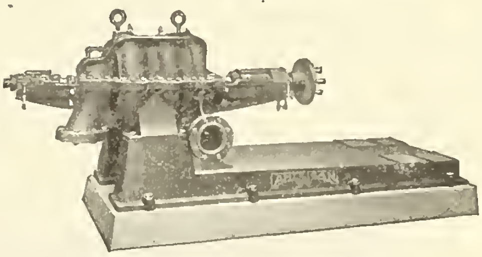

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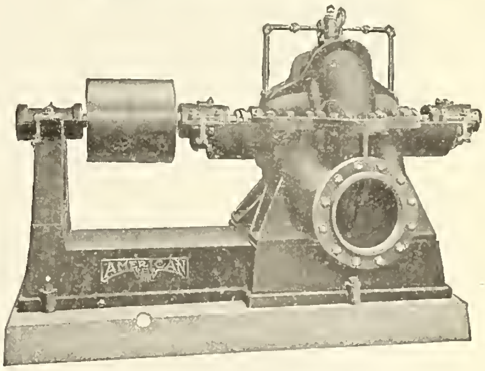

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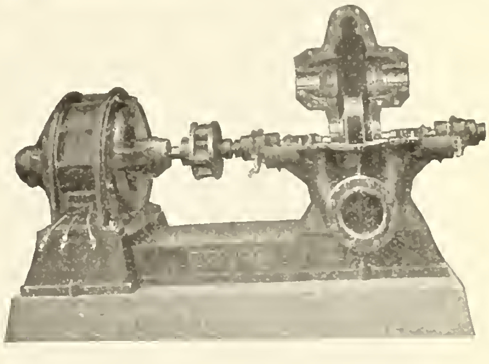

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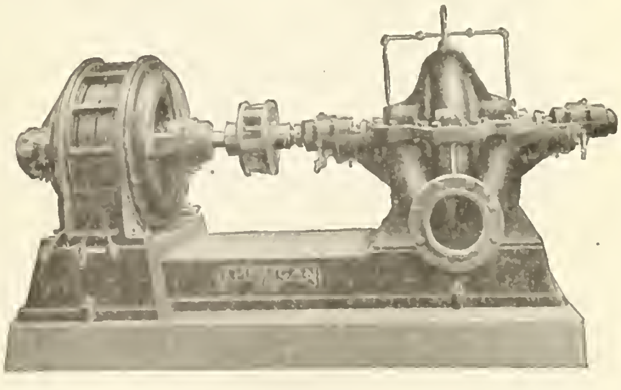

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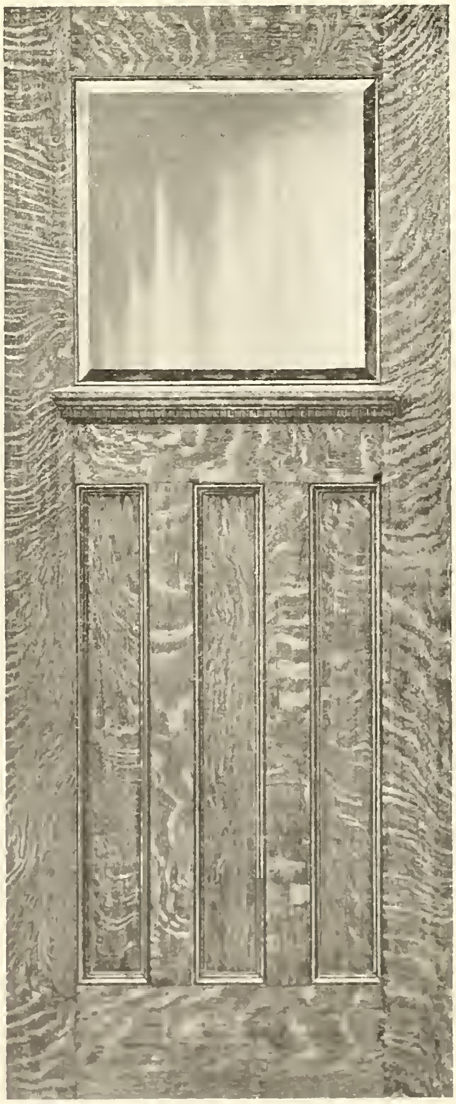

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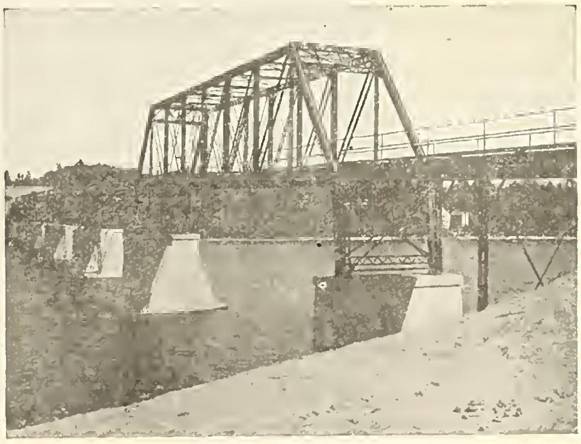

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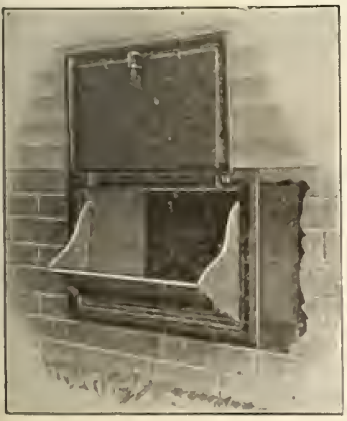

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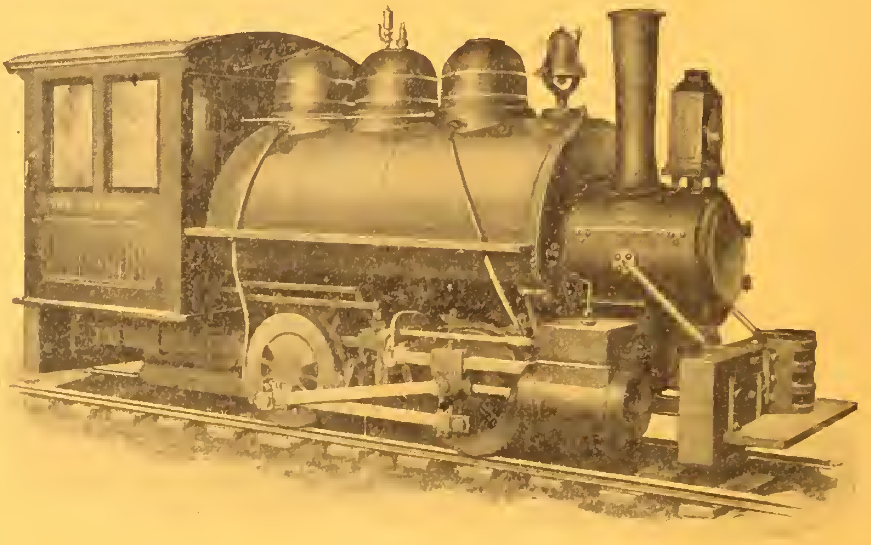

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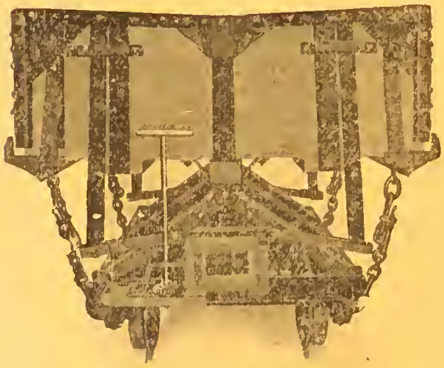

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DUMP CARS

are stronger—longer running—safer cars—cars that will do work cheaper than any other make to be obtained. Let us tell you why—

Catalogue upon request.

F. H. Hopkins & Co.

MONTREAL

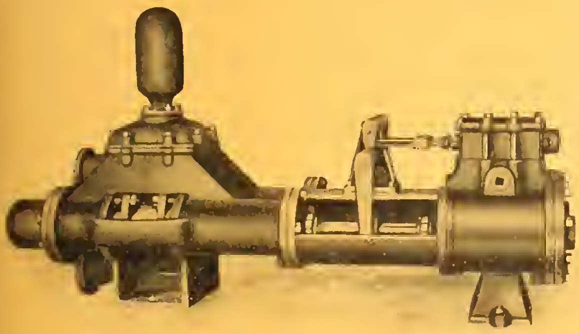
BRANCH OFFICES: General Supply Company of Canada, Ltd., Winnipeg Agents
Ritchie Contracting & Supply Company, Ltd., Vancouver Agents

Vol. 26 Toronto, February 21, 1912 No. 8

ESTABLISHED 1886

Contract Record and Engineering Review

We manufacture
Steam and Power Pumps, Condensers, Travelling Cranes, etc.



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The Smart-Turner Machine Company
HAMILTON, ONTARIO Limited

"MADE IN CANADA"

Bent Glass

Made in all Kinds of Glass on Short Notice

Large Bent Plate Glass for Shop Fronts a Specialty

The Toronto Plate Glass Importing Company, Limited
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Head Office and Works: 91 to 133 Don Roadway
TORONTO

Good Buyers
consider value of more importance than price and buy "RAND" machinery

SHEET PILE DRIVERS

PNEUMATIC TOOLS

Canadian RAND Co. Limited
Commercial Union Bldg., MONTREAL, CAN.

Continuous and Machine Banded Wood Stave

WATER PIPE

RESERVOIR TANKS

for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

Pacific Coast Pipe Co., Limited
P. O. Box 563 Vancouver, B. C.
Office and Factory, Granville St., near High Bridge
WRITE FOR CATALOGUE
Full Particulars and Estimates Furnished

lphabetical Index of Advertisers, Page 16 Classified Directory to Advertisements, Page 6

TANKS

for

Pulp and Paper Mills
Chemical Works
Oil Refineries, Etc.

We also build

Steel Structures

to support them.

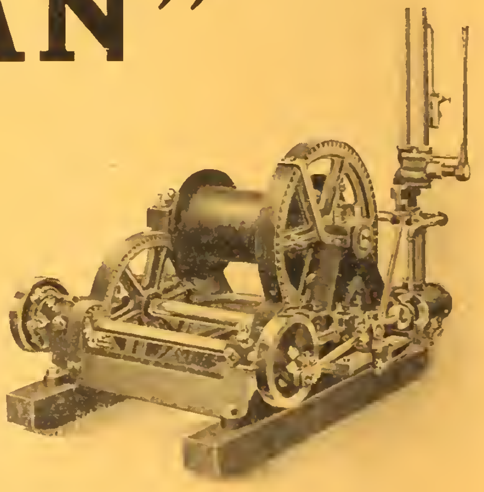
Write us for quotations

MacKinnon, Holmes & Company Limited
SHERBROOKE, QUE.

"AMERICAN"

Slewing Engine

Write TO-DAY for full information regarding the LATEST IMPROVED, MOST POWERFUL, SMOOTHEST RUNNING, CHEAPEST TO MAINTAIN Slewing Engine on the market.



Name

Address

Please send information and prices on "AMERICAN" Slewing Engine.

AMERICAN HOIST
& DERRICK CO.
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C.R
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American Hoist & Derrick Company
ST. PAUL, U. S. A.

Gorman, Clancey & Grindley	Edmonton and Calgary, Alta. and Nelson, B.C.
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If It Passes Our Tests, It Will Meet Your Needs

There is no longer any question about the suitability of concrete for the making of sewer pipes, drains or any work that has to withstand the corrosive effects of acids or the damages inflicted by frost and water.

Reinforced concrete, **properly made,** has been successful in the most rigid tests and is now the recognized material for all important work.

Properly made concrete, means, not only thoroughly mixed and the right proportions of cement, aggregate and sand—it also means that the cement used, be of the highest standard of purity.

The pipes shown here were made in Hamilton, Ont., by the REINFORCED CONCRETE PIPE CO. of JACKSON, MICH. They have made pipes for some of the most important work done, both in the United States and Canada and they now use "Canada" Cement exclusively.

THE REINFORCED CONCRETE PIPE CO., report that although they have, on one piece of work, used cement from no less than five of our mills, they could see no difference in the quality of the cement or in the work produced. That is what the "Canada" Brand stands for:—absolute purity and absolute uniformity.

Canada Cement Co., Limited

MONTREAL - TORONTO - WINNIPEG - CALGARY

WE ARE INTO 191

with every bit of confidence and every ounce of enthusiasm that we ever had in the Good Qualities of the

SMITH MIXER

We are still standing back of these machines with the same guarantee—that they are

Quicker, Better and More Durabl

than any other concrete mixer on the market today.

Montreal, 318 St. James St.
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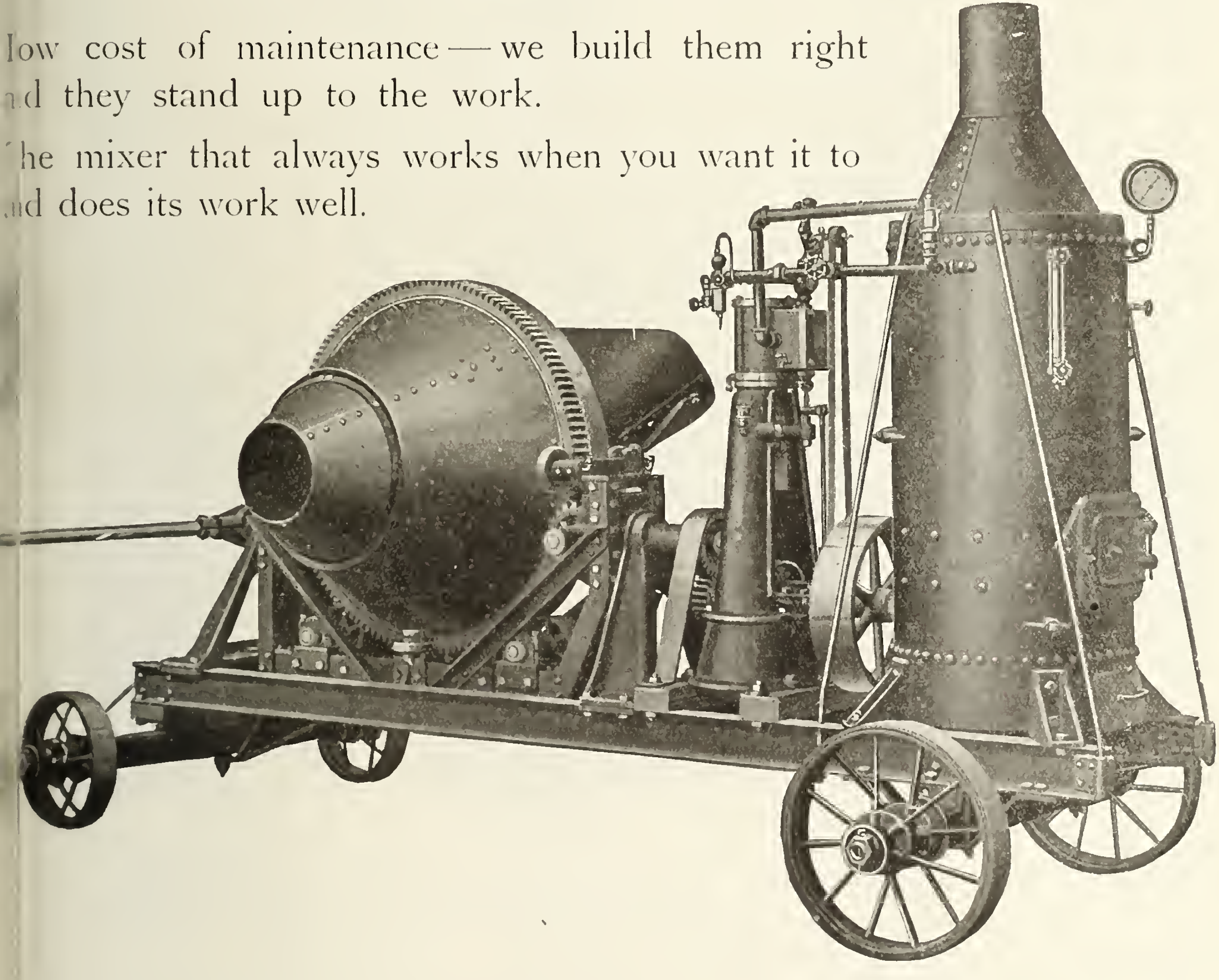
MUSSENS

A Smith Mixer on Your Job

Means Increased Profits for You

low cost of maintenance—we build them right
d they stand up to the work.

he mixer that always works when you want it to
d does its work well.



Send in your name for our new Catalogue 45
"Smith Mixer and Concrete Equipment."

LIMITED

Winnipeg, 259-261 Stanley St.
Calgary, Samis Block
Vancouver, 365 Water Street

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- Air Compressors
  - Abenaque Machine Works
  - Canadian Rand Co.
  - Escher Wyss & Co.
- Architects
  - Weeks, Arthur L.
- Architects' Levels
  - Watts & Son, E. R.
- Architectural Iron Work
  - Canada Wire & Iron Goods Co.
  - Dennis Wire & Iron Works
  - Meadows Co., Geo. B.
- Architectural Terra Cotta
  - Asbestos Mfg. Co.
  - Chillas-Black, Ltd.
  - Don Valley Brick Works
  - Northwestern Terra-Cotta Co.
  - Toronto Plate Glass Imp't'g. Co.
- Asphalt Plant
  - East Iron Machine Co.
- Belting
  - Federal Eng. & Supplies, Ltd.
- Blowers
  - Sturtevant Co., B. F.
- Boilers
  - Berg Machinery Co.
  - Canadian Boving Co.
  - Inglis, John
  - Jenckes Machine Co.
  - Leonard & Sons, E.
  - Marsh & Henthorn
  - McDougall Caledonian Iron Wks
  - Mussens Limited
  - Waterous Engine Works Co.
- Brick
  - American Enamelled Brick Co.
  - Don Valley Brick Works
  - Hamilton Pressed Brick Co.
  - Northwestern Terra-Cotta Co.
  - Port Credit Pressed Brick Co.
- Brick Chimneys
  - Canadian Kellogg Co.
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  - Wadsworth Howland & Co.
- Brick Machinery and Supplies
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  - Whitehead, John
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  - Cleveland Bridge Co.
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  - Dominion Bridge Co.
  - Hunter Bridge & Boiler Works
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  - Phoenix Bridge and Iron Works
  - Sarnia Bridge Co.
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  - American Hoist & Derrick Co.
  - Andresen, H. P.
  - Browning Engineering Co.
  - Canadian Fairbanks
  - Owen Bucket Co.
  - Thew Shovel Co.
- Cement
  - Alsen Portland Cement Co.
  - Britnell & Co.
  - Bremner, Alex.
  - Canada Cement Co.
  - McNally & Co., W.
  - Morrison & Co., T. A.
  - Ontario Lime Association
  - Rogers Supply Co.
  - Rogers, Alfred Limited
- Cement Tools
  - Slack, T.
- Coal Chutes
  - Down Draft Furnace Co.
- Coal Handling Apparatus
  - American Hoist & Derrick Co.
  - Browning Engineering Co.
- Concrete Mixers and Machinery
  - Blystone Machinery Co.
  - Canada Foundry Co.
  - Ford Iron Co.
  - General Machinery Co.
  - Hopkins & Co., F. H.
  - Jenckes Machine Co.
  - Koehring Machine Co.
  - London Concrete Machinery Co.
  - Mussens Limited
  - Morrison & Co., T. A.
  - Standard Scale & Supply Co.
  - Steel & Radiation (Cement Gun)
  - Wettlaufer Bros.
- Conduits
  - Conduits Co., Limited
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  - Bain & Ross
  - Bennett, Robt.
  - Eastern Pipe & Construction Co.
  - Foundation Co.
  - Holmes, Fred.
  - McIlwraith, Jas. A.
  - Nadel & Adler
  - Norcross Bros. Co.
  - Wells & Gray
- Contractors' Lights
  - Pyle National Elec. Headlight Co
- Contractors' Plant and Supplies
  - American Hoist & Derrick Co.
  - Acme Eqpt. & Engineering Co.
  - Bates & Edmonds
  - Beatty & Sons, M.
  - Browning Engineering Co.
  - Cleveland & Erie Mach. Co.
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  - Ford Iron Co.
  - Hepburn, John T.
  - H. & E. Lifting Jack Co.
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  - Montreal Locomotive Works
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  - Ormsby, A. B., Limited
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  - American Hoist & Derrick Co.
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- Crushers (Stone and Rock)
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  - Jenckes Machine Co.
  - London Concrete Machinery Co.
  - Mussens Limited
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  - Universal Crusher Co.
  - Willis Shaw Machine Co.
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  - American Hoist & Derrick Co.
  - Hepburn, John T.
- Dredges
  - Beatty & Sons, M.
  - Browning Engineering Co.
  - Willis Shaw Machine. Co.
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  - Beatty & Sons, M.
  - Canada Foundry Co.
  - Canadian Rand Co.
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  - Harvey, J.
- Kilns
  - Berg Machinery Co.
  - Sturtevant Co., B. F.
- Electrical Fixtures
  - Factory Products
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- Engines
  - Berg Machinery Co.
  - Canadian Boving Co.
  - Ford Iron Co.
  - Inglis, John
  - Jenckes Machine Co.
  - Leonard & Sons, E.
  - Mussens Limited
  - Sturtevant Co., B. F.
  - Waterous Engine Works Co.
- Engineers (Civil) and Mechanical
  - Barber & Young
  - Bowman & Connor
  - Chipman & Power
  - Farmer, John T.
  - Fure, Edw. O.
  - Galt Engineering Co., John
  - Hancock, H. Syd.
  - Inglis, John
  - Kennedy, Jas. C.
  - Lea & Ferguson
  - Mace, T. Harry
  - Mitchell, C. H.
  - Taylor, James
- Exhaust Heads
  - Sturtevant Co., B. F.
- Field Instruments
  - Beckman Co., L.
  - Consolidated Optical Co.
  - Eaton Company, T.
  - Gurley, W. & L. E.
  - Watts & Son, E. R.
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  - American Water Softener Co.
- Filtration Plants
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  - Escher Wyss & Co.
- Hoisting Apparatus
  - Abenaque Machine Works
  - American Hoist & Derrick Co.
  - Bates & Edmonds
  - Beatty & Sons, M.
  - Browning Engineering Co.
  - Ford Iron Co.
  - Factory Products
  - Inglis, John
  - Jenckes Machine Co.
  - Hopkins & Co., F. H.
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  - Gartshore-Thomson Pipe Co.
  - Munderloh & Co.
  - National Iron Works
  - Pacific Coast Pipe Co.
  - Pedlar People
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  - Steel Co. of Canada.
  - Steel & Radiation
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  - Inglis Co., John
- Pumps and Pumping Machinery
  - Abenaque Machine Works
  - American Well Works
  - Bates & Edmonds
  - Beatty & Sons, M.
  - Canada Foundry Co.
  - Canadian Boving Co.
  - Canadian Rand Co.
  - Cook, A. D.
  - Escher Wyss & Co.
  - Hopkins & Co., F. H.
  - Inglis Co., John
  - McDougall Caledonian Iron Wks

(Continued on page 12)

DON VALLEY BRICKS

Residence of Mr. J. C. Eaton, Toronto. **Messrs. Wickson & Gregg, Architects**

Don Valley Porous Terra Cotta Fire Proofing, Foundation Bricks, Facing Bricks and Enameled Bricks Exclusively Were Used in This Structure

¶ These bricks have been the unanimous choice of discriminating architects and owners in competition with samples submitted by the leading brick firms of Canada and the United States. They are the only thoroughly vitrified facing bricks ever manufactured in the Dominion, and the most exclusive high-class pressed brick on the American continent.

¶ The above view is an illustration of one of the many important buildings in which this product is used.

THE DON VALLEY BRICK WORKS

Head Office: 36 Toronto St., TORONTO

Montreal Agent: David McGill, 83 Bleury Street

Most Mixing Least Fixing

The M-C Mixers don't even know the meaning of the words 'Repair Bills'

Most Mixing Least Fixing

Do you enjoy paying for the repairs on your Concrete Mixers?

Wouldn't you like to feel that your mixers were going to work throughout the season with all parts intact?

Wouldn't you like to turn into profit the money you spent last year on spare parts and repairs?

Get a catalogue of the Famous **M-C** "*Rail Track*" Mixers and study the details,—it is the details which count.

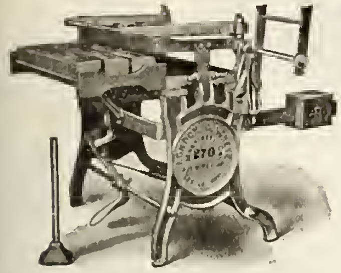
WRITE US TO-DAY

The Ford Iron Co.

MONTREAL Limited

CONCRETE MACHINERY

For all classes of work


Cement Brick Machine

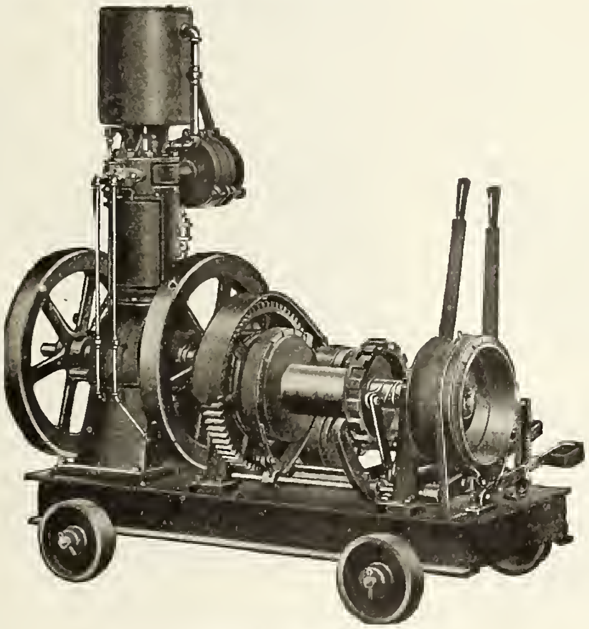
We are the only large manufacturers in Canada who specialize.

Lawn Vases

That is why we are able to supply the Contractor with his every requirement, in Machinery for the working of Concrete. Nothing counts like THE PRODUCTION ON A LARGE SCALE.

CONTRACTOR
TELL US YOUR
REQUIREMENTS

ASK FOR 1912
CATALOGUE

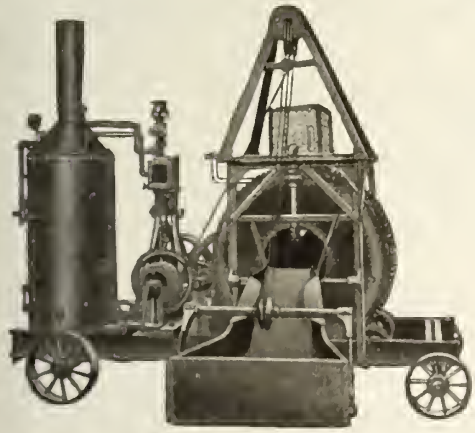

Builder's Double Acting Hoist

THE LONDON MACHINES are doing ALL WE CLAIM for them.

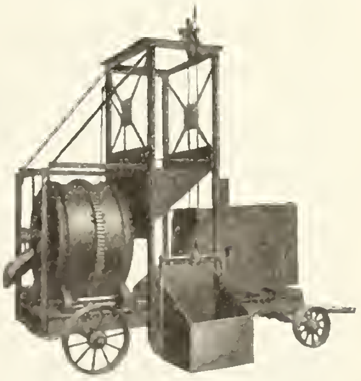
While we are BUILDING MACHINES we are BUILDING our REPUTATION.

THE ENORMOUS SALE of OUR MACHINES is sufficient proof to us that it pays to build machines of the VERY BEST TYPE.

The CHEAP article we do not make.


Standard Drum Batch Mixer

We manufacture a full line of CONCRETE MACHINERY and Cement WORKING TOOLS, also CONTRACTORS' MACHINERY and EQUIPMENT.


aving Machine with Side Loade

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

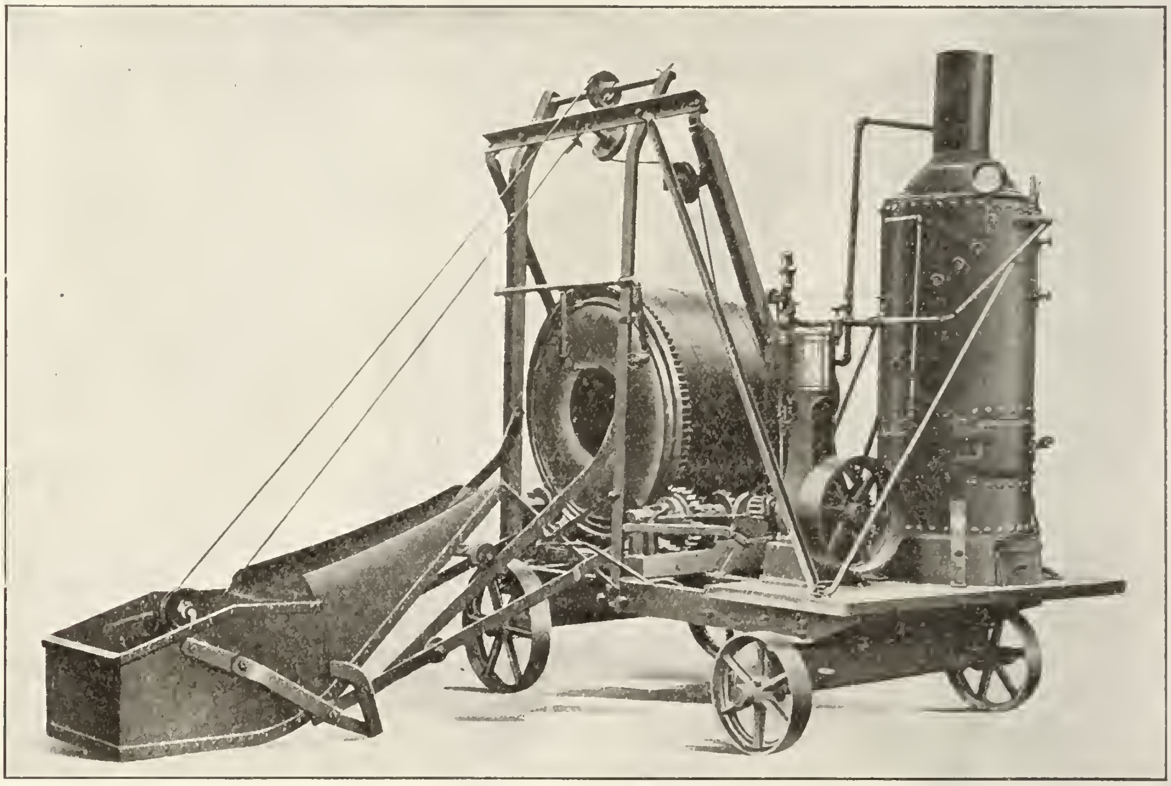
BRANCHES.—
The Foss & Hill Machinery Co., 329 St. James St., Montreal, Que. G. B. Oland, 28 Bedford Row, Halifax, N. S.
B. C. Equipment Co., Suite 606-607 Bank of Ottawa Bldg., Vancouver

WE ARE THE LARGEST MANUFACTURERS OF CONCRETE MACHINERY IN CANADA.

Positive Mixing with a

"Wettlaufer Heartshape"

Mixer



The "Wettlaufer Heartshape" Mixer Guarantees Positive Mixing.

¶ Of the many designs for the drum of a mixer the **"Heartshape Drum"** has been found the most satisfactory.

¶ No other drum can give such a thorough mix as the **"Heartshape."**

¶ With every revolution of this drum the batch is turned end for end—this ensures perfect mixing.

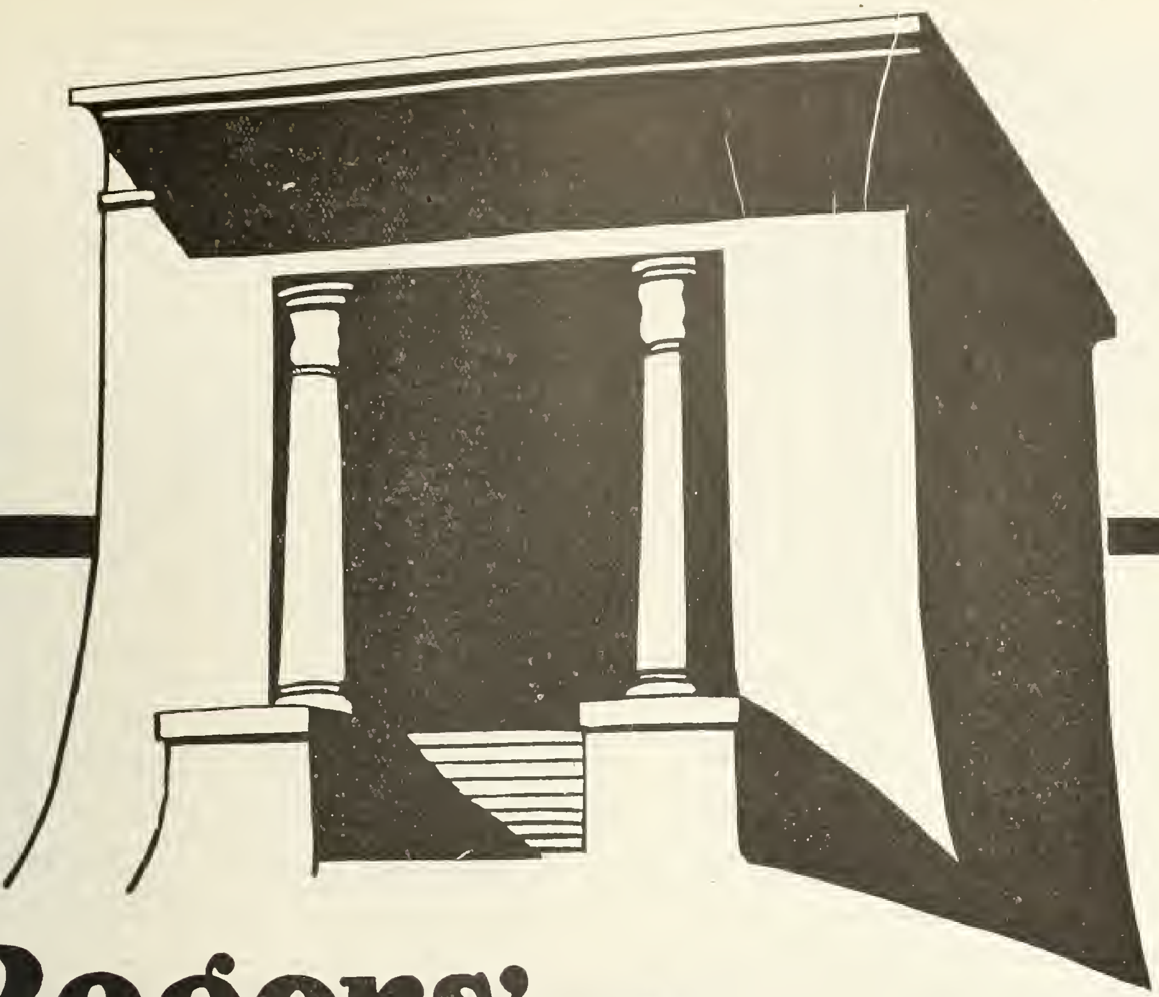
¶ At every dumping operation the **"Heartshape Drum"** empties positively clean.

¶ There is no chance of any clogging or corroding.

¶ The **"Wettlaufer Heartshape"** will give absolute satisfaction.

Wettlaufer Bros.

178 Spadina Ave. Toronto, Ont.



Rogers' Cement

THE Rogers Brands of Portland Cement are carefully *standardized* to an exact formula, that each brand may *always* give the same high and *regular standard* of strength, *regular* period of setting, and *regular binding* qualities for thin mixtures. It is wise to *specify* Rogers Brands on all important concrete construction. The architect benefits in the *finish* and *stability* of the finished structure. The contractor benefits in the *uniformity* and *rapidity* of set. The mills embraced in the Rogers organization are conveniently located for *prompt* shipment at *low freight cost,* and *reserve stock* is available for *emergency* shipments.

The *Service* of the Rogers organization bears no small relation to actually making the use of Rogers Brands of Portland Cement the most *economical* and *profitable* product for construction undertakings of every type in which Portland Cement is to be largely used.

Our Mills are located at Atwood, Durham, Hanover
Kirkfield, Orangeville, Owen Sound and Wiarton

Alfred Rogers, Limited

28 West King Street, TORONTO
N. J. Dineen & Co., Western Sales Manager, Winnipeg

5

CLASSIFIED INDEX TO ADVERTISEMENTS—Continued

- Pumps and Pumping Machinery (Continued from page 6)
  - Mussens Limited
  - Ontario Wind Eng. & Pump Co.
  - Smart-Turner Machine Co.
  - Waterous Engine Works Co.
- Quarry Machinery
  - Canadian Rand Co.
  - Improved Equipment Co.
  - Johnston & Chapman
  - George Anderson & Co.
- Railway Supplies
  - Ford Iron Co.
  - Gartshore, John J.
  - Hopkins & Co., F. H.
  - Mussens Limited
- Reinforcements, Concrete & Steel
  - Ambursen Hydraulic Cons. Co.
  - Canada Wire & Iron Goods Co.
  - Factory Products
  - Ford Iron Co.
  - Greening Wire Co., B.
  - Leach Contracting Co.
  - Page Wire Fence Co.
  - Steel Co. of Canada
  - Steel & Radiation
  - Trussed Concrete Steel Co.
  - Turner, C. A. P.
- Revolving Stone Screens
  - Greening Wire Co., B.
  - Johnson & Chapman Company
- Road Machinery
  - Erie Machine Co.
  - Ford Iron Co.
  - Hamilton Machinery Co.
  - Morrison & Co., T. A.
  - Mussens Limited
  - Western Wheeled Scraper Co.
  - Waterous Engine Works Co.
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  - Asbestos Mfg. Co.
  - Canadian Supply Company
  - Galt Art Metal Co.
  - Metallic Roofing Co.
  - Metal Shingle & Siding Co.
  - Noble, Clarence W.
  - Paterson Mfg. Co.
  - Standard Paint Co.
- Rubber Belting
  - Goodyear Tire & Rubber Co.
- Safes and Vaults
  - Taylor, J. & J.
- Sand Spreader
  - Aut. Sidewalk Sand Sp'd'r. Co.
- Sand and Gravel
  - Rogers Supply Co.
  - Sand & Supplies
  - Smyth & Ryan
  - York Sand and Gravel Co.
- Screens
  - Greening Wire Mfg. Co., B.
  - Johnson & Chapman Company
- Sewer Pipe
  - Britnell & Co.
  - Canada Iron Corporation
  - Dominion Sewer Pipe Co.
  - Ford Iron Co.
  - Gartshore Thomson Pipe Co.
  - National Iron Works
  - Ontario Sewer Pipe Co.
  - Ontario Lime Association
  - Standard Drain Pipe Co.
- Shovels (Steam)
  - Browning Engineering Co.
  - Beatty & Sons, M.
  - Canada Foundry Co.
  - Ford Iron Co.
  - Hopkins & Co., F. H.
  - Montreal Locomotive Works
  - Mussens Limited
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- Smoke Stacks
  - Des Moines Bridge Co.
- Steam Apparatus
  - Sturtevant Co., B. F.
- Steel Bars
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  - Steel Co. of Canada
- Steel Shingles and Ceilings
  - Galt Art Metal Co.
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  - Britnell & Co.
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  - Doolittle & Wilcox
  - Hagersville Contracting Co.
  - Laurentian Granite Co.
  - Mahan & Company
  - McMillan & Son, R.
  - Morrison & Co., T. A.
  - Myers, Oakley
  - Queenstown Quarry Co.
  - Rogers Supply Co.
  - Roman Stone Co.
  - Sackville Freestone Co.
  - Sand & Supplies
- Stone Saws
  - Anderson, Geo.
- Structural Iron and Steel
  - Canada Steel Co.
  - Des Moines Bridge Co.
  - Dominion Bridge Co.
  - Factory Products
  - Ford Iron Co.
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  - Jenckes Machine Co.
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  - McDougall Caledonian Iron Wks
  - Ontario Wind Eng. & Pump Co.
  - Piggott & Co., Thos.
- Technical Journals
  - Ainsworth & Sons, Wm.
- Tents
  - Turner & Sons, J. J.
  - Woods Limited
- Testing and Inspection Bureau
  - Hunt & Co., Robt. W.
- Valves
  - Canada Iron Corporation
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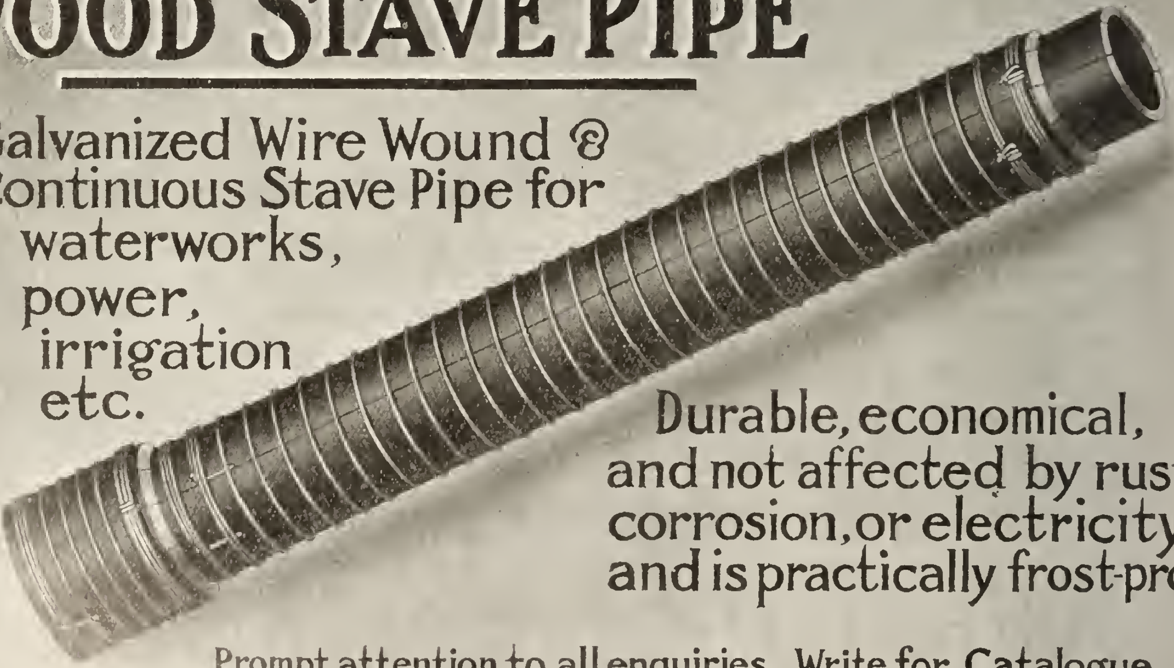

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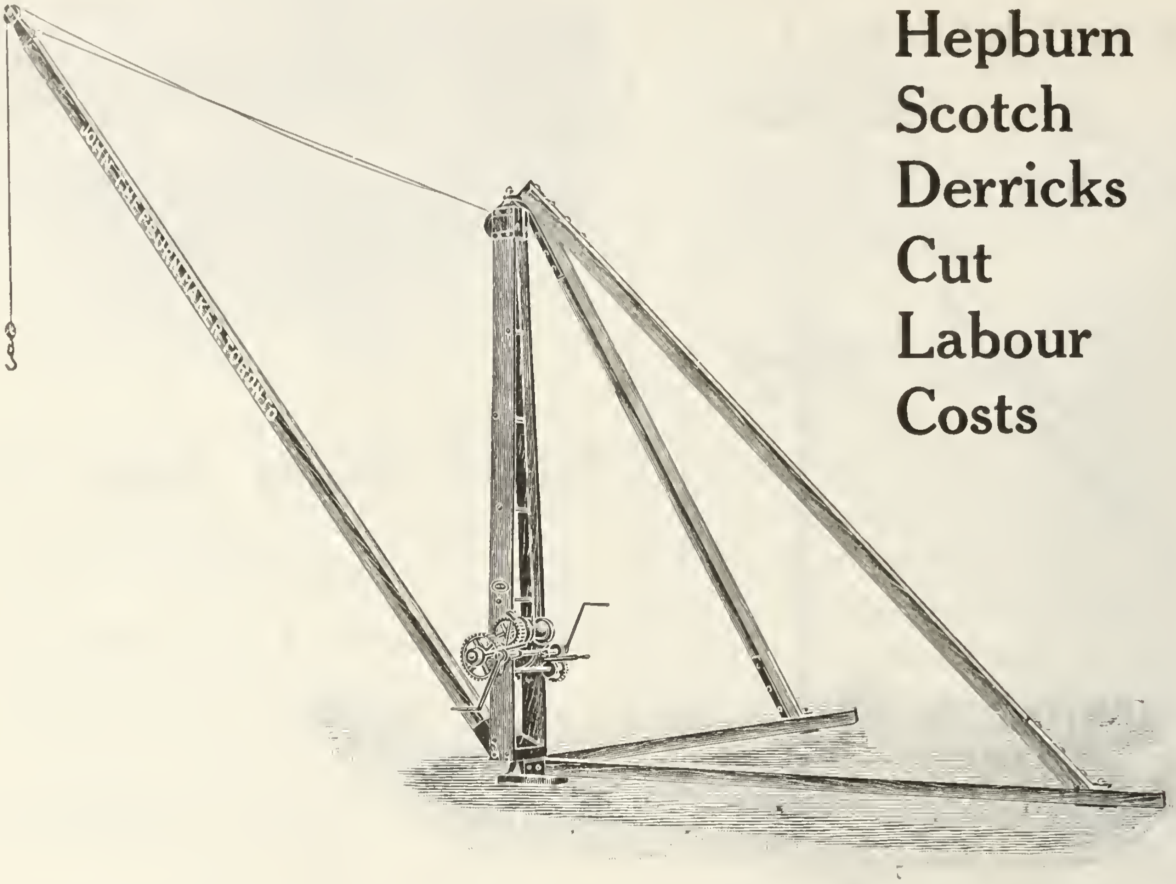
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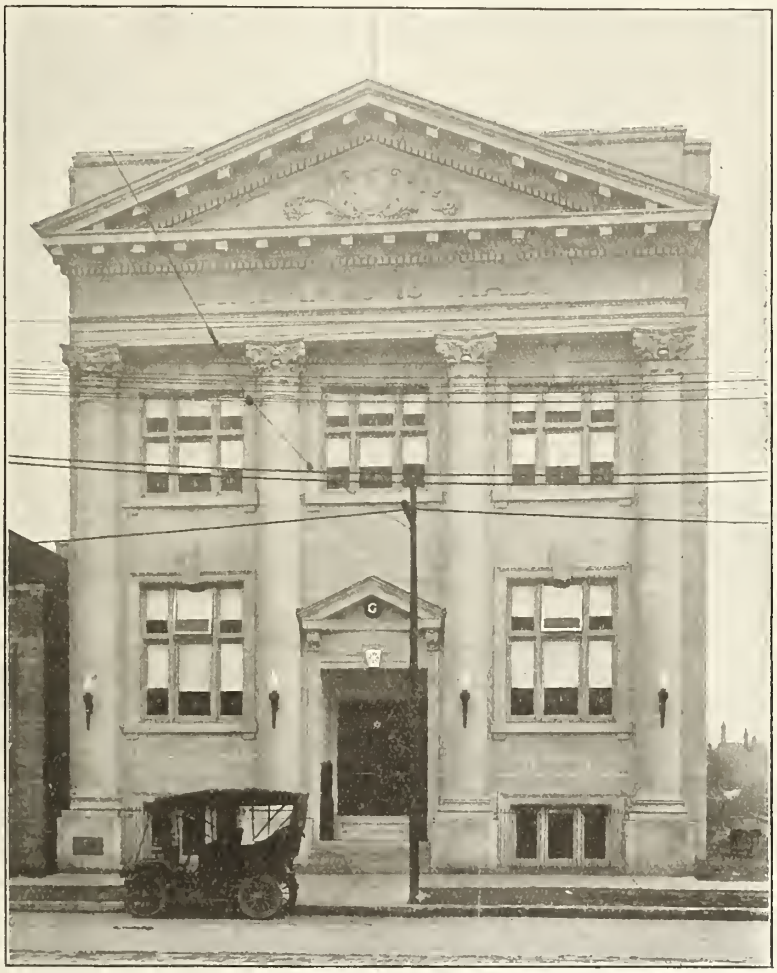

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Abenaque Machine Works	74
Acme Equipment & Engineering Co.	98
Ainsworth & Sons, Wm.	25
Albert Manufacturing Co.	77
Alsen's American Portland Cement Wks.	78
Ambursen Hydraulic Construction Co. of Canada, Limited	
American Enameled Brick & Tile Co.	82
American Hoist & Derrick Co.	2
American Spiral Pipe Works	79
American Water Softener Co.	
American Well Works	
Anderson & Co., 1905 Ltd. George	22
Andresen, H. P.	
Asbestos Mfg. Co.	99
Automatic Wood Box & Turning Co.	82
Bain & Ross	92
Bates & Edmonds Motor Co.	23
Batts Limited	
Beatty & Sons Limited, M.	79
Beckman Company, L.	
Bell Filtration Co. of Canada, Ltd.	102
Bennett, Robert	86
Berg Manufacturing Company	
Blystone Manufacturing Company	99
Bowman & Connor	92
Bremner Limited, Alex.	91
Britnell & Co., Ltd.	86
Brodie & Company, James	72
Brown Hoisting Machinery Co.	83
Browning Engineering Company	83
Buffalo Meter Co.	27
Business Systems Limited	75
Bryan Manufacturing Company	104
Canada Cement Co., Ltd.	3
Canada Foundry Co., Ltd.	20-73-97
Canada Iron Corporation Limited	91
Canada Steel Company	31
Canada Wire & Cable Co.	23
Canada Wire & Iron Goods Co.	79
Canadian Boving Company	30
Canadian Bridge Co., Ltd.	88
Canadian Fairbanks-Morse Co., Ltd.	22
Canadian Kellogg Company	
Canadian Office and School Furniture Company, Limited	
Canadian Norcross Bros. Co.	18
Canadian Pipe Co., Ltd.	90
Canadian Rand Co., Ltd.	1
Canadian Supply Company	95
Cement Era Publishing Company	
Ceresit Waterproofing Company	84
Chipman & Power	92
Christie Henderson & Company	79
Cleveland Bridge & Engineering Co., Ltd.	88
Cleveland & Erie Mach. Co.	87
Cloisonne Glass Co. of Canada	
Colonial Glass Co.	
Cook, A. D.	
Commercial, The	72
Conduits Company, Limited	91
Consolidated Glass Company	96
Consumers' Gas Company	
Consolidated Optical Co., Ltd.	
Consolidated Stone Co.	
Contractors' Supply Co., Ltd.	86
Corinthian Stone Co.	24
Cream City Equipment Co.	96
Crushed Stone Limited	75
Dahlstrom Metallic Door Company	70
Dennis Wire & Iron Works Co., Ltd.	90
Des Moines Bridge & Iron Co.	79
Dickson Bridge Works Co., Ltd.	
Doolittle & Wilcox Limited	91
Dominion Bridge Co., Limited	88
Dominion Creosoting Company	76
Dominion Marble Co., Ltd.	21
Dominion Sewer Pipe Co., Ltd.	21
Dominion Wood Pipe Co., Limited	12
Don Valley Brick Works	7
Down Draft Furnace Company	98
East Iron & Machine Co.	78
Eastern Pipe & Construction Co., Ltd.	80
Eaton & Co., T.	85
Eric Machine Shops	87
Factory Products Limited	35
Farmer, John T.	92
Ferguson, H. S.	92
Ford Iron Company, Limited	8
Foundation Company	93
Fuce, Edward O.	92
Galt Art Metal Co., Limited	
Galt Engineering Co., John	92
Garlock Packing Company	85
Gartshore, John J.	92
Gartshore-Thompson Pipe & Foundry Co., Ltd.	90
General Machinery Co., Ltd.	98
Georgian Bay Shook Mills, Ltd.	107
Gibb, Alexander	
Goodyear Tire & Rubber Co. of Canada, Ltd.	33
Greening Wire Co., Ltd., B.	
Guarantee Company of North America	92
Gurley, W. & L. E.	84
Hagersville Contracting Co., Ltd.	13
Hamilton Pressed Brick Co.	26
Hamilton Machinery Co., Ltd.	36
Hancock, Jr., H. Syd.	92
Harvey, J.	87
H. & E. Lifting Jack Co.	96
Heinicke Inc., H. R.	80
Hepburn, John T.	14
Hobbs Manufacturing Co., Ltd.	
Holmes & Sons, Fred	86
Hopkins & Company, F. H.	108
Hunt & Company, Robert W.	92
Hunter Bridge & Boiler Co., Ltd.	89
Imperial Wire & Cable Co., Ltd.	107
Improved Equipment Company	
Inglis Company, John	71
International Marine Signal Co., Ltd.	29
Jamieson Lime Company	100
Jenckes Machine Company, Limited	103
Johnston, A. H.	
Johnston & Chapman Company	23
Kennedy, James C.	92
Kerr Engine Co., Ltd.	
Koehring Machine Co.	32
Laurentian Granite Co., Ltd.	92
Lea, R. S.	92
Leach Concrete Company	94
Leonard & Sons, E.	75
London Concrete Machinery Co., Ltd.	9
London Gas Power Co., Ltd.	72
Luxfer Prism Company	
Mace, T. Harry	92
MacKinnon Holmes & Co., Ltd.	2
MacLean Daily Reports	100
Marsh & Henthorn Limited	72
McCoy Company, Henry J.	25
McDougall Caledonian Iron Wks. Co., John	73
Mahan & Company	94
McMillan & Sons, W. N.	98
McNally & Co., William	89
Meadows, George B.	35
Metallic Roofing Co., Ltd.	72
Metropolitan Paving Bricks Co.	31
Miller & Co., George M.	
Mitchell, Chas. H. & Percival H.	92
Mitchell Company, Ltd., Robert	88
Mitshkun Company, M.	74
Missisquoi Marble Co., Ltd.	82
Montreal Locomotive Works, Ltd.	75
Morrison & Co., T. A.	92
Munderloh & Co., Ltd.	13
Mussens Limited	4
Myers, Oakley	75
National Bridge Co., of Canada, Ltd.	89
National Iron Works Ltd.	91
Neptune Meter Co.	27
Noble, Clarence W.	78
Northwestern Terra Cotta Company	83
Ontario Asphalt Block Co., Limited	78
Ontario Lime Association Limited	77
Ontario Sewer Pipe Co., Ltd.	20
Ontario Wind Engine & Pump Co., Ltd.	75
Ormsby, Limited, A. E.	19
Owen Bucket Co.	80
Pacific Coast Pipe Co., Ltd.	1
Page Wire Fence Co., Ltd.	
Paterson Manufacturing Co.	106
Pedlar People Limited	105
Phoenix Bridge & Iron Works, Limited	89
Piggott & Company, Thos.	
Port Credit Brick Co., Ltd.	90
Power & Son	
"Prime White" Road Oil Co.	
Pyle-National Electric Headlight Co.	17
Queenstown Quarry Co., Ltd.	91
Reid & Brown	92
Rhodes Curry Company, Limited	72
"R. I. W." Damp Resisting Paint Co.	17
Rogers Limited, Alfred	11
Rogers Supply Company	25
Roman Stone Co., Limited	15
Sackville Freestone Co., Ltd.	29
Sand & Supplies, Ltd	89
Sarnia Bridge Co., Ltd.	89
Sheppard & Sons, James	94
Slack, T.	87
Smart-Turner Machine Co., Ltd.	1
Smith, Limited, Thomas & Wm.	34
Smyth & Ryan	86
Standard Drain Pipe Co., Ltd.	21
Standard Foundry & Machine Co.	13
Standard Ideal Co., Ltd.	36
Standard Scale & Supply Co.	96
Steel Company of Canada	30
Steel & Radiation, Limited	28
Steward, A. P.	74
Stinson-Reeb Builders' Supply Co.	
Sturtevant, B. F.	35
Taylor, J. & J.	
Taylor, Hogle & Davis	
Tide Water Iron Works	77
Thew Automatic Shovel Co., The	31
Thompson & Co., B. & S. H.	21
Tiffin Wagon Company	74
Toronto Furnace & Crematory Co.	32
Toronto Plate Glass Importing Co., Ltd.	1-83
Troy Wagon Works Co.	82
Trussed Concrete Steel Co.	82
Turner, C. A. P.	
Turner & Sons, J. J.	99
Union Water Meter Co.	27
Universal Crusher Co.	80
Vulcan Iron Works	80
Wadsworth Howland & Co., Inc.	79
Waterous Engine Works Co., Ltd.	77
Watson Wagon Company	101
Watts & Son, E. R.	
Weeks, Arthur L.	92
Wells & Gray, Ltd.	104
Western Canada Contractor	86
Western Wheeled Scraper Co.	13
Wettlaufer Bros.	10
Whitehead & Co., Ltd., John	
Wilson Bros., Ltd.	
Woods Limited	27
Wyss & Co., Escher	101
York Sand & Gravel Co.	86

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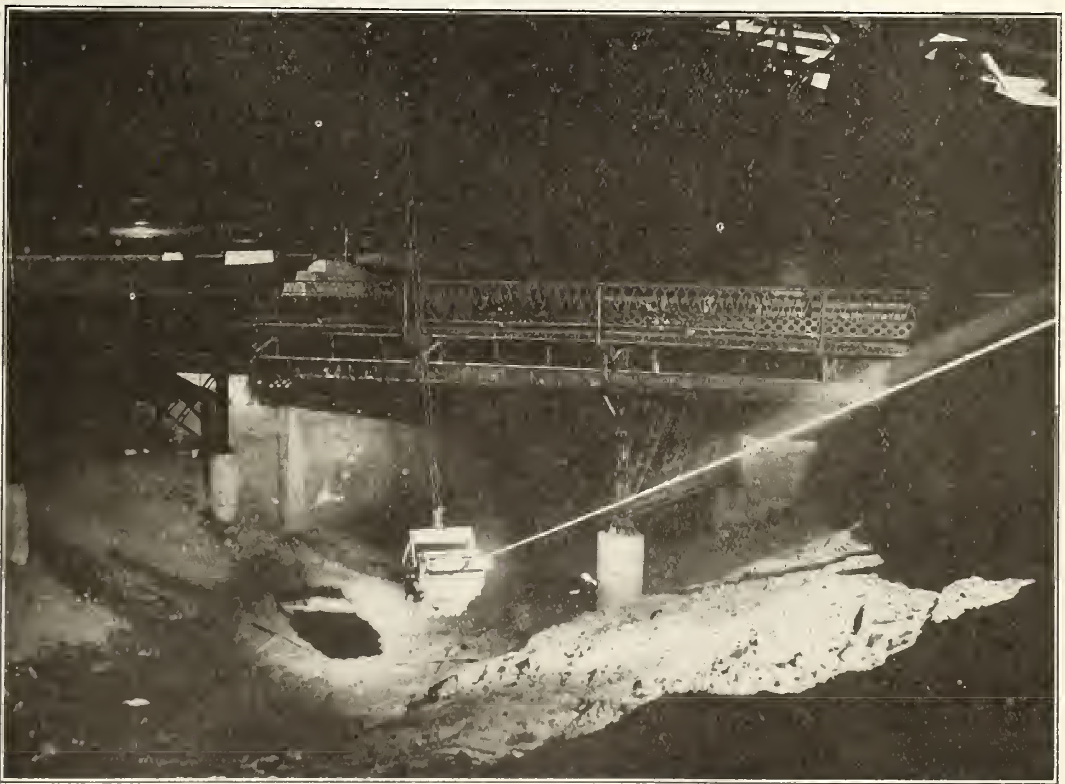
There are over 16,000 Pyle-Nationals in use. This is proof of their superiority. If you want more write for catalog.



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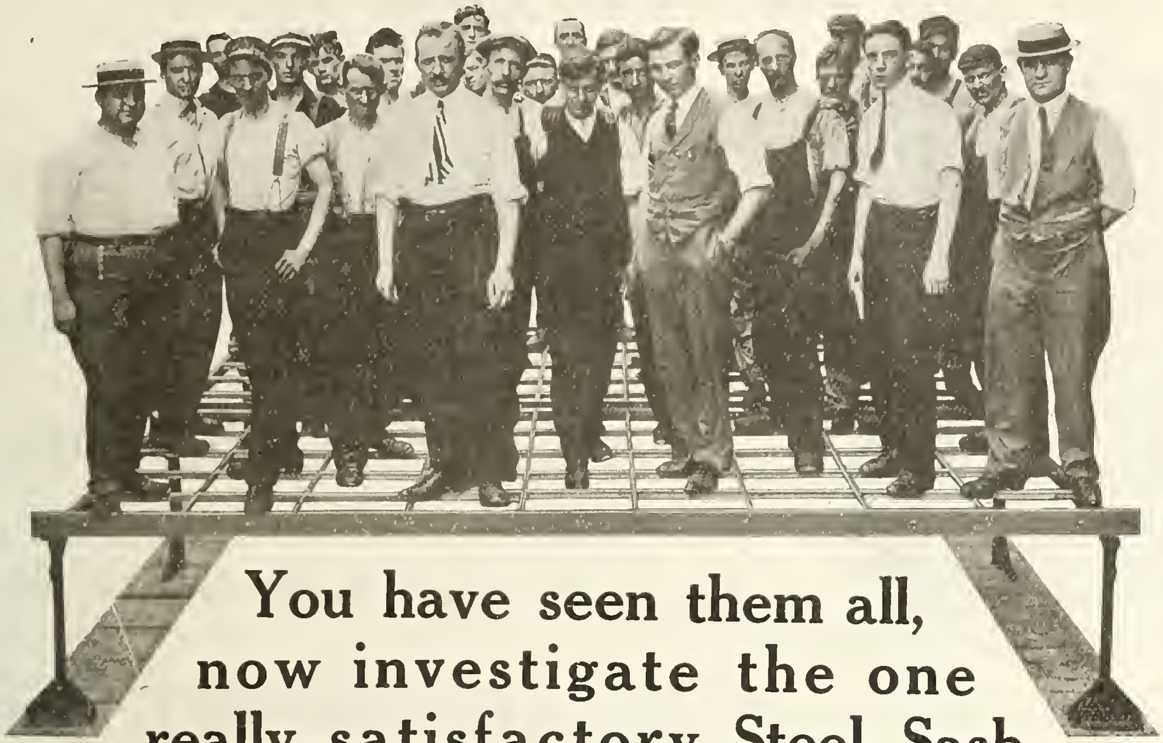

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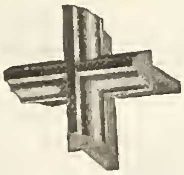

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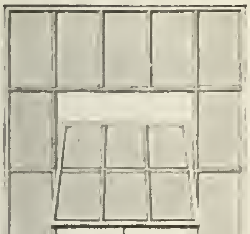

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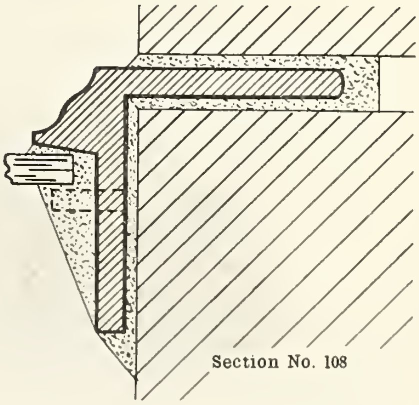
Steel Sash need investigation; in that investigation you will need our Catalog. This, together with samples, we are prepared to leave in your office.



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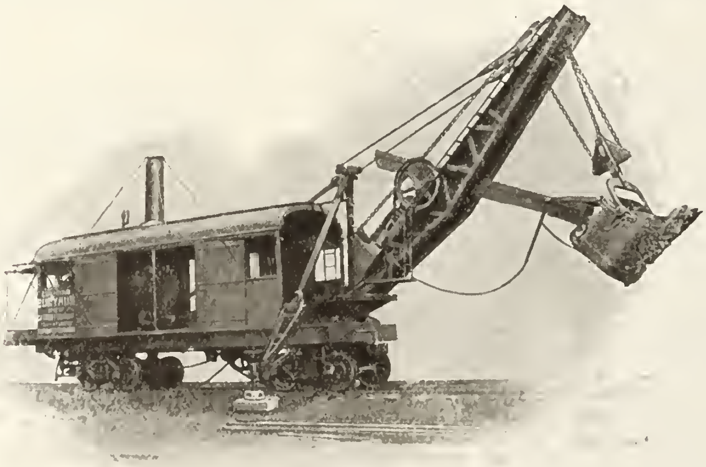

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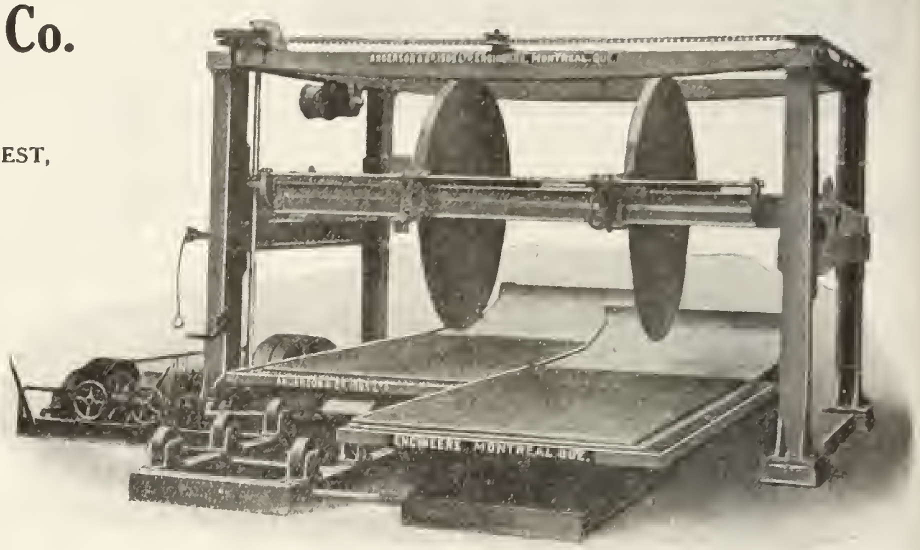

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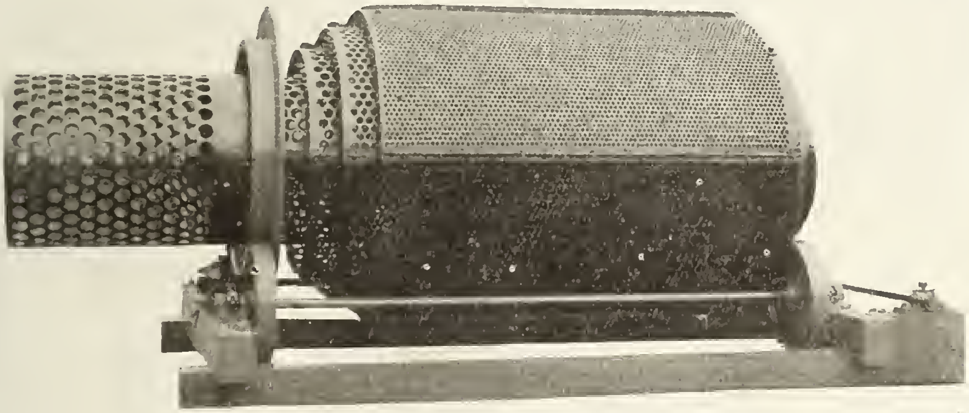

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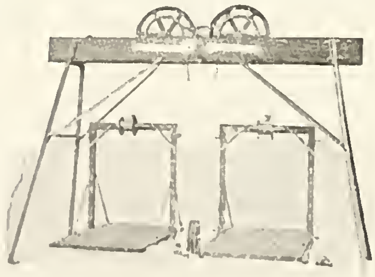

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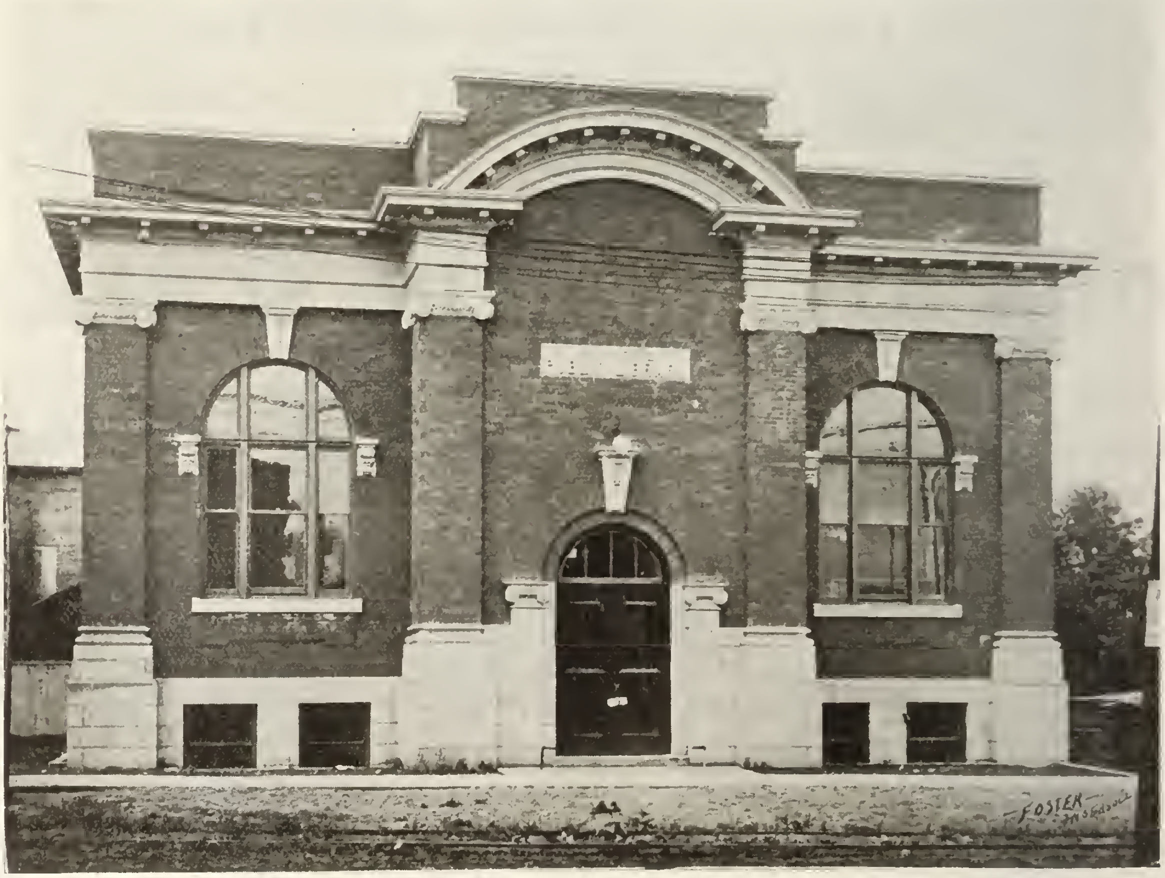

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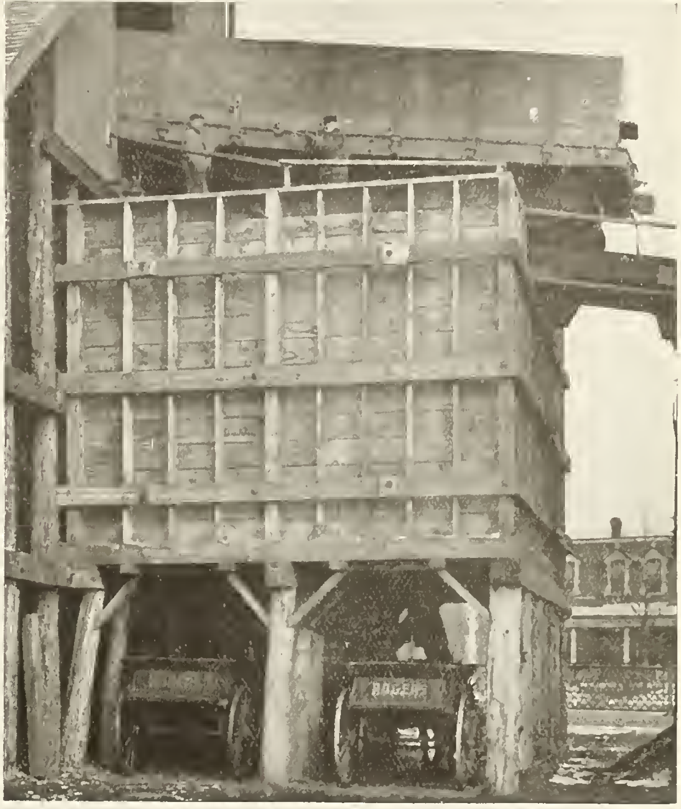

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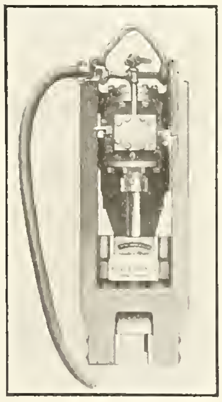

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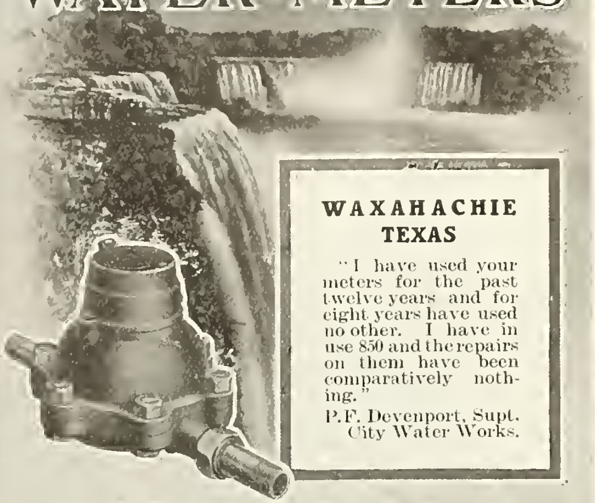

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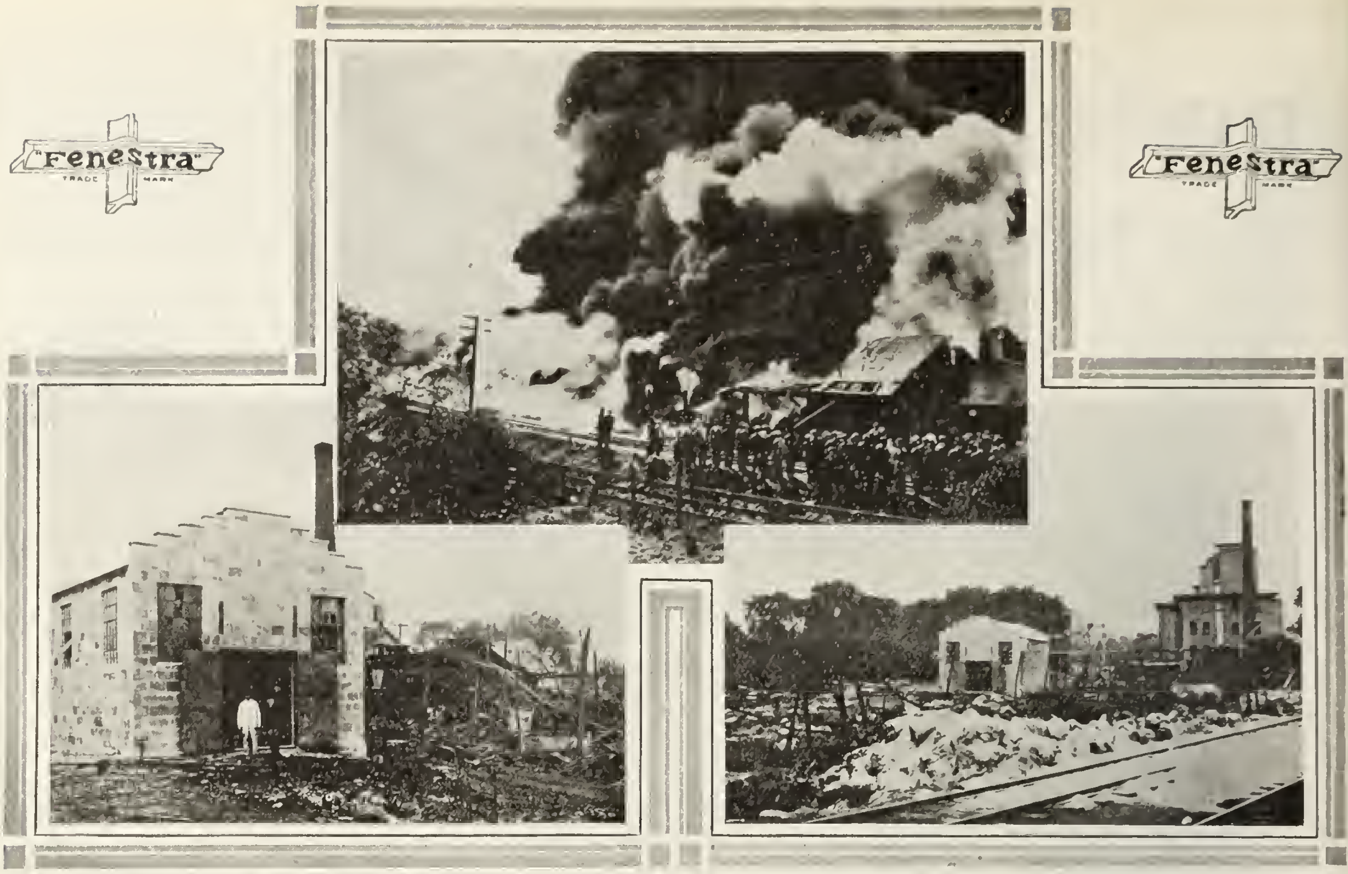

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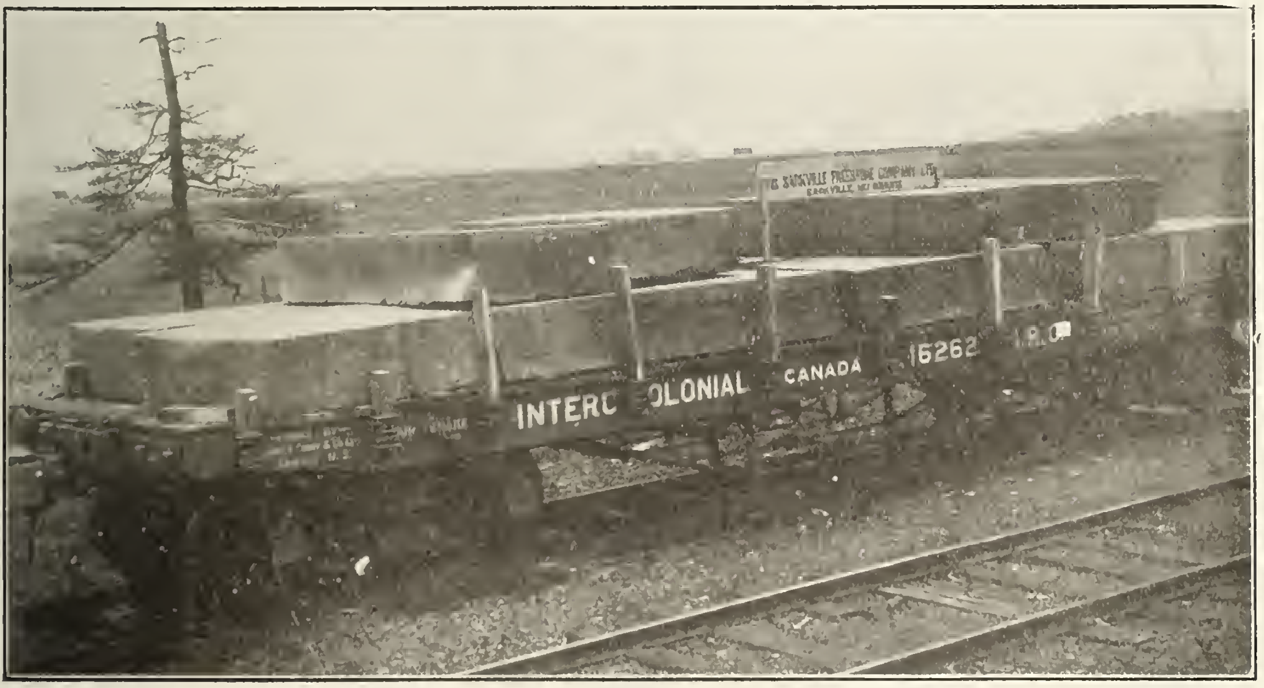

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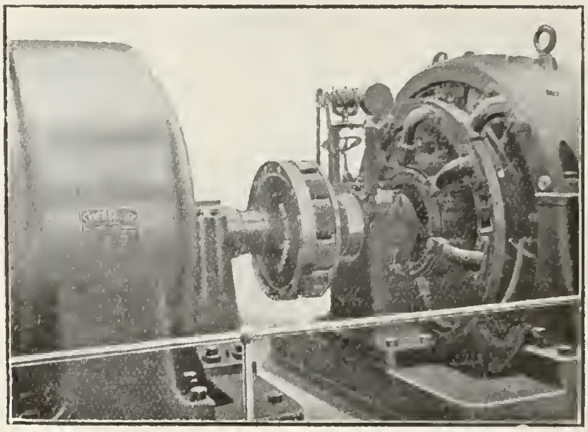

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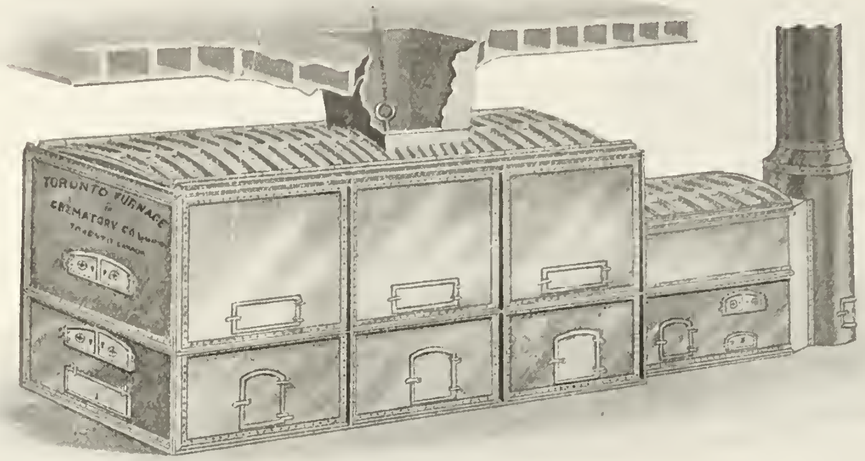

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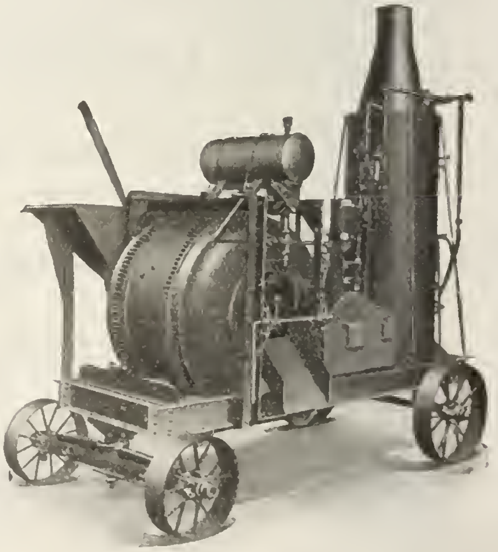

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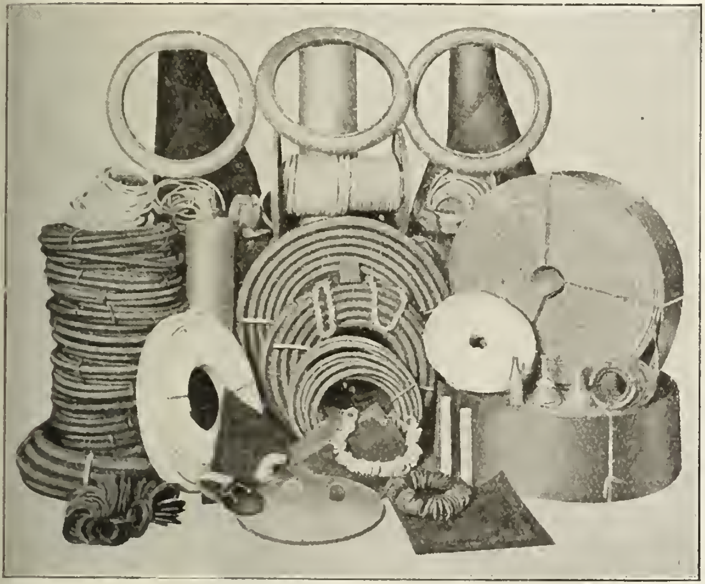

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Make your power Transmission an *asset* instead of a *liability*—a money-saver instead of a power-waster. Belt your machinery with

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High-Speed, Friction-Surface

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Built the Famous Goodyear way, for high-speed pulleys where great tensile strength is demanded

The Imperial has the cling of rubber and the endurance of many plies of hard-twist, long-fibre *cotton fabric*, rubberized, cured and vulcanized into one solid, enduring piece.

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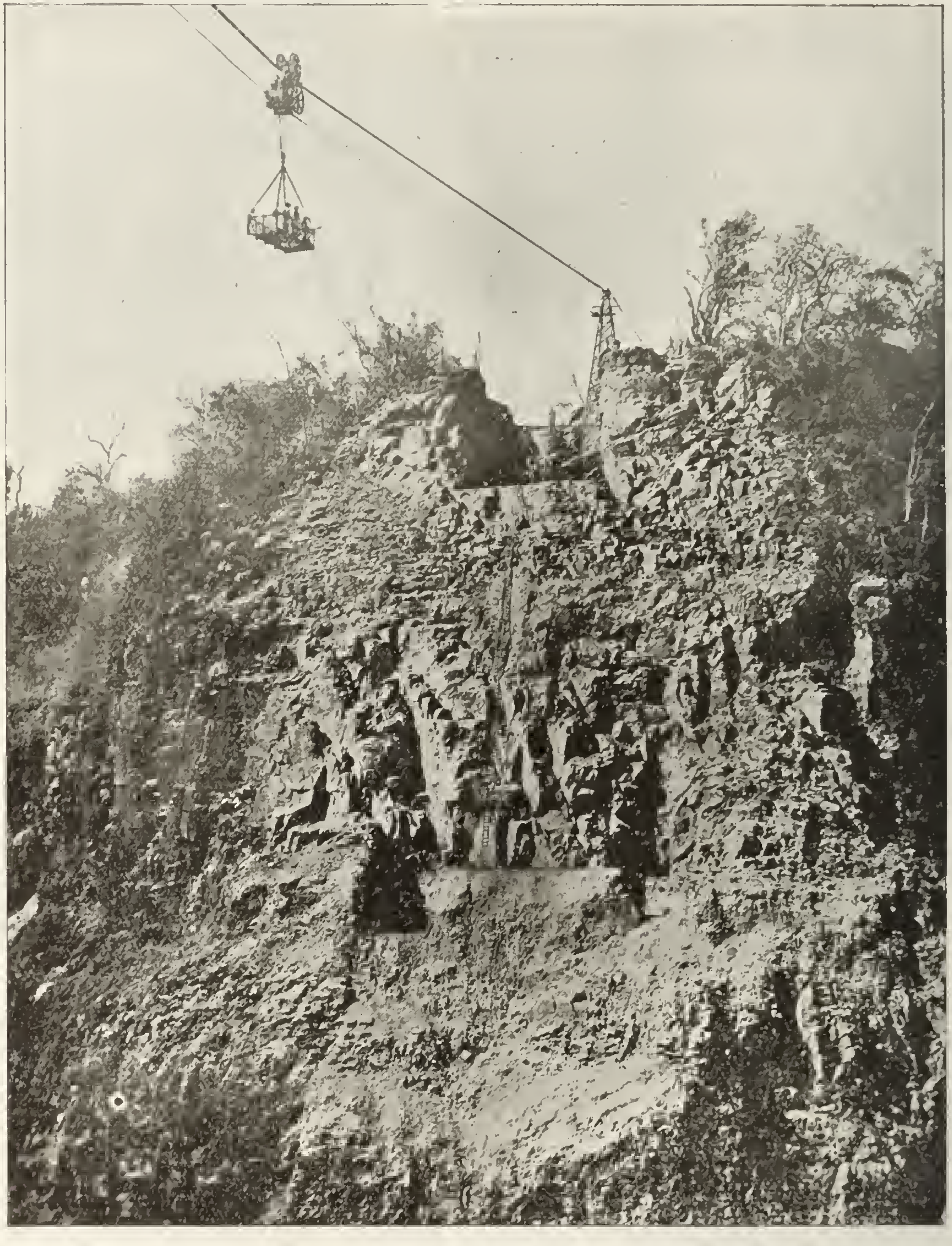

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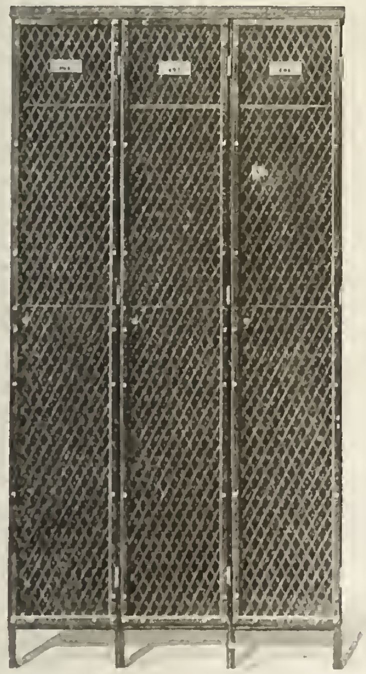

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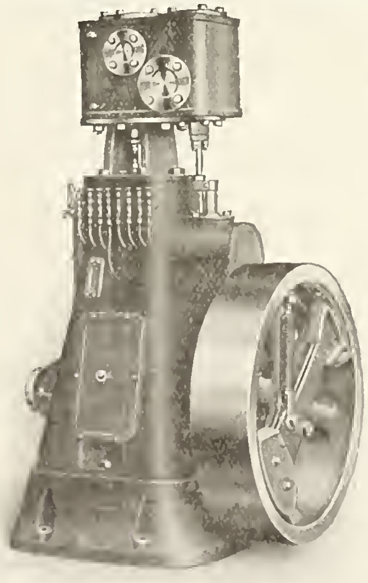

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Alphabetical Index of Advertisers Page 16

Vol. 26 February 21, 1912 No. 8

Development of Northern Ontario

> "The Government intends to ask the House during the present session for authority to borrow a sum of money not exceeding $5,000,000 for the purpose of colonization and development in New Ontario, or rather, Northern Ontario, including not only the Temiskaming country, but the country in the vicinity of Sault Ste. Marie, Port Arthur and Fort William, Rainy River district, and other localities in the northern portion of the province."

FEW announcements in recent years have been of greater significance to the Province of Ontario than that made last week in the legislature by Sir James Whitney, in regard to seeking authority from the government to borrow a sum of $5,000,000 towards the colonization of New Ontario and the carrying out of extensive road work. The general feeling of Ontario's legislators may be gauged from the fact that Sir James' announcement was received with cheers, and that both the Government and the Opposition were united in their enthusiasm. The Opposition leader congratulated the Prime Minister upon the announcement and said that the only doubt in his mind was whether the proposed expenditure was adequate to the needs of the north country. Such delightful unanimity takes one back to the brave days of old, when "none was for a party but all were for the state."

Anything savoring in the slightest of a political digression, however, is not within the province of this paper. We are simply concerned with expressing our approval of an aggressive measure that will open up a great country and literally pave the way for its development—incidentally providing a fresh field for the constructor.

Both Ontario and Quebec are doing excellent work in the way of opening up new territory, but this latest project of the former province must be regarded as a master stroke. When one realizes the extent of the good roads movement in Quebec and Ontario and receives frequent reminders of the extent to which the same policy is being emulated in Western Canada, it impresses one with the thought, or rather the conviction, that here in Canada is presented an unexcelled opportunity for the highway engineering expert and the road builder.

Good roads constitute perhaps the most important factor in industrial expansion, and developments such as these cannot be noted too closely. This is no party question, and the statement is absolutely devoid of ulterior meaning. Certainly the point is significant to the manufacturer concerned with the commercial side of the question, but we are not emphasizing dollars and cents just now. Our function ends with paying our tribute to that which we regard as one of the most important and progressive strokes of policy made by any provincial government. With such a policy going into effect we may reasonably look for great things from that northern country. Great things have already come from there—and this with practically no transportation facilities.

Many have thought vaguely of New Ontario as a country which might possibly mature at some distant date. It seems, however, that this important territory will come into a measure of its own within our day and generation.

A Noteworthy Convention

THERE is every prospect that the forthcoming convention of the Ontario Good Roads Association, which is to be held in Toronto at the County of York Municipal Buildings, 57 Adelaide street east, on Monday, February 26, and the two following days, will give a great impetus to the good roads movement in this section of the country. The previous meetings of this Association have been remarkable for their practical nature and for the presentation of valuable papers which have become a part of standard road literature. At the last convention, which was held in Toronto, every county in the province was represented, and, in addition, numerous city, town, village and township municipalities.

A great deal has happened in eastern Canada during the year. The Province of Quebec is contemplating an expenditure of ten millions on road work and important plans have been formulated by the Ontario Legislature—all of which, of course, is common knowledge. The point is that these developments have elevated such organizations as The Ontario Good Roads Association to a position of national importance. Undoubtedly, the announced policy of the Present Dominion Government to recognize the claims of those who build and maintain the King's highway to receive assistance in the improvement of the great trunk highways of the Dominion, the determination of the Ontario Government to further assist in the good roads movement, and the interest manifested by municipalities, will make this meeting a most important one.

Full particulars of the Convention may be obtained from the Secretary-Treasurer of the Association, Col. J. E. Farewell, of Whitby, Ont. The President is

Mr. T. L. Kennedy, of Dixie, Ont. It may be well for us to remind those who propose attending the meeting that reduced fares can be obtained by purchasing single fare tickets and asking for a convention certificate.

British Firm's Criticism of Canadian Contract Conditions

In our issue of February 7 we reviewed at some length the conditions experienced in Canada by the British manufacturer. One of the points to which we directed special attention was the need for a more adequate time allowance on important contracts. Another matter we have frequently discussed is the unreasonably large deposit required in this country.

We have pleasure in publishing the following communication from a leading British firm, Messrs. Clayton, Son & Company, Limited, of Leeds. This firm is well known as the makers and erectors of all kinds of structural steel work. It may be of further interest to mention the fact that at the Japan-British Exhibition in 1910 they were awarded the gold medal for steel welded pipes. Messrs. Clayton write us:

"On many occasions we have been unable to tender for Canadian public works owing to the short time allowed for tendering. As a rule, the first intimation that these contracts are in the market has come to us through the Board of Trade Intelligence Department, and then it has been too late to obtain particulars from Canada and submit a tender in time.

"We have now appointed agents in Canada and are endeavoring to get in touch with these jobs quickly, but if Canadians are at all desirous for British firms to tender successfully it seems to us that they should send on specifications and particulars to an agent in London and advertise the work in some standard trade paper, particulars to be obtained on application to the agent in London.

"Further, we think that the Canadian system of specifying that an important deposit shall be made with each tender is both inconvenient and unnecessary. The general practice here, even with the most important jobs, is to pay a small sum for the specification, drawings and particulars, which is then returned on receipt of a bona fide tender. No deposit is required and personal sureties are invariably accepted.

"Of course, it is not for us to dictate to other people as to how they should conduct their business, and in future we shall try, as far as possible, to fall in with the Canadian regulations, but we trust that more time will be allowed British tenderers."

Efficiency in Waterworks Management

In a paper before the New England Water Works Association, W. H. Richards, engineer and superintendent of the water and sewer department of New London, Conn., outlined what he believed would be the lines of development of efficiency in water works management, believing that the day is not far distant when the management of both public and private plants will be judged by the costs. He believes that in the case of a municipal plant the water board should be non-political and its duties be strictly separated from the executive part of the work, being confined to matters of general policy, approval of expenditures, appropriations, general plans, formulation of rules, etc.; appointment of subordinates and removal of the same being made only on recommendation of the general manager, superintendent or whatever title may be given to the executive head.

The superintendent, while not necessarily a graduate engineer, should certainly be a man who is mechanically ingenious, capable of interpreting a drawing, or making one, if necessary, having a thorough knowledge of construction and tools and capable of rapidly acquiring (if he does not already have) a knowledge of the fundamental principle of hydraulics; while above all else he should understand the principles of business. Such a man cannot be obtained without an adequate salary. His powers as well as his responsibilities should be large. At the outset many policies must be tested and problems solved by the superintendent. Among these may be the material best adapted for the water mains, considering character of water and other local conditions, and the same is true of service pipe, the quality of water, pressure, etc., having a bearing upon the choice of material, size and weight of such pipe. The selection of type of water meter, the separation of the theoretical from the practical in regard to the purification of water, etc., also require good judgment. In selecting a designing or consulting engineer (the superintendent should not be expected to be either) the board might remember that a six weeks' trip to Europe inspecting foreign plants is not sufficient to make an expert of an engineer—nor of a commissioner.

In the matter of rates it should be remembered that every gallon of water has a fixed value dependent upon the cost, capacity of the work and expense of maintaining it. If the rates permit one man to get two gallons for the cost of one, then the man who uses one gallon and pays for it pays part of the other man's water rate. The cost of the water system and its maintenance except for proper cost for extinguishing fires, should be borne by the consumer in proportion to the amount of water used. The practice of furnishing water free to city departments, hospitals and other institutions, as well as furnishing extra fire protection free to certain parties who are patrons of certain insurance companies, is not only unjust to the rate-payers, but makes impossible a statement of the measure of efficiency. If a park or pleasure ground

A precise system of accounting should be carried out faithfully. Under existing conditions it is usually impossible to tell whether the works are efficiently managed or not from the published accounts. A balance sheet is of rare occurrence in a water report, and an inventory or any charge for depreciation is still more rare. In one case the president of a water company furnishes all the water pipe used and a relative furnishes all the coal without competition, and the consumer pays for both in high rates.

The reports should show all details of operation and be used intelligently as a basis for management. Of what use is a meter when 30 per cent. of the water is lost through leaking joints in the pipe and twenty per cent. by waste in public buildings? If the plant is one of any size the superintendent must have some regular system for checking the work of his employees. A large part of his time is consumed in the office, deciding a multitude of problems, from the color of paint to quality of yarning, from the probable register of an obstructed meter to the efficiency of his pumps, and he cannot therefore supervise the work of his subordinates in person, but should be able to through a system of reports.

Good Roads—The Symbol of Progress

Satisfactory Practice Reviewed, with Particular Reference to Western Canada —Methods of Apportioning Cost — The Question of Ultimate Economy

By R. E. Speakman, City Engineer, Brandon, Man.

IN very ancient times there were no roads. The wants of man were few and were easily satisfied by Nature, and his knowledge and intercourse were limited to his own immediate vicinity. But as the population increased and with the necessities of living, man was led further afield to supply them. He formed rough path-ways which in time came to be the recognized routes from one locality to another, by means of which he satisfied his desire for investigation and intercourse with his neighbors.

Countries inhabited by the least civilized people, whose wants can be supplied in the immediate vicinity are almost without roads, hence it is said that roads are the symbol by which to estimate the progress of the people. If the community is stagnant the state of the roads are a sure indication of the fact.

Roads are not only the offspring of civilization but they are also the greatest contributors to it, and the surest sign of advancement.

The civilization of to-day with its large cities and towns, its commerce and intellectual life could not exist without good roads. One of the first steps in opening up a new country is the location and building of roads for the accomodation of the travelling public, the carriage of commodities and for the development of the natural resources of the country.

A new country can only be opened up by roads, and until these are made it is practically closed.

We are told of a stone roadway having been built 4000 years B.C. over which were carried the materials for the construction of the Egyptian pyramids. We are also told of a roadway connecting the ancient city of Memphis with the pyramids.

It is to the Carthagenians that credit must be given for the earliest systematic effort at road building, for as early as the fifth century B.C. they had constructed a system of roads that enabled them to hold their own with the Roman Empire for 400 years.

The Romans learned the art of roadmaking from the Carthagenians and so fully were the great advantages appreciated that they soon became the greatest road builders in history. The first Roman road was built about 312 years B.C., by Appius Claudius- and was named after him, the Appian Way. In the part of England in which I lived there are still Roman roads. The width of these roadways as constructed by the Romans was from 30 to 40 Roman feet. The middle portion being for infantry and the margins for horses and carriages. Many miles of these roads still remain as great monuments to the energy and skill of the Romans and verify the old saying, "All roads lead to Rome."

After the decline of the Roman Empire we are told the roads fell into disuse, but later became practicable for pack horses and rude vehicles but no effort was made to restore them until about the middle of the eighteenth century, when a revival of road building arose almost at the same time in England and France.

The highways in England up to that time were in very poor condition and an effort was made to improve them by establishing a system of turnpikes. Many thousand miles of these roads were built, but they were little better than the old roads and no further advance was made until the time of MacAdam and Telford, to whom England is indebted for its admirable system of roads.

Just as soon as an extension of the population to this Great West, the development of better roads became necessary, and the introduction of railroads into this country makes it still more necessary that the roads between the farms and the railway station and cities should be improved.

Tractive Resistance

Before considering the construction of roads it would be well to understand and consider the resistance to traction, and the financial considerations involved and the questions that confront the engineer in making roads to suit the different uses to which they will be put.

The object of a road is to provide means of transportation with least expenditure of time and money. This depends largely upon the amount of resistance to tractive force offered by the road, which is a matter of great importance in fixing the gradient to be adopted on a proposed road.

Resistance to traction is made up of:—

(1) Axle friction which is independent of the condition of the road.

(2) Rolling resistance due to irregularities of the surface of the road and to the penetration or sinking of the wheels into the roadway.

(3) The resistance due to the grade of the road.

The tractive force or power required to move vehicles along a road is variable—depending upon the condition of the road, and the power of the horse. The power of the horse varies according to its strength, weight and special training, the speed at which it travels, and the hours of work.

Reliable tests have been made to determine the force required to overcome the combined resistances of the vehicle and the road. On an asphalt street the tractive resistance required to move one ton is from 30 to 70 lbs.; gravel roads, 50 to 100 lbs.; sand roads, 100 to 200 lbs.; macadam, 20 to 100 lbs.

Investigations in Toronto

The resistance to tractive effort on paved streets was recently investigated in the city of Toronto. All experiments were made with a good steady team of horses weighing 2490 pounds and drawing a truck weighing 2710 pounds with a load of 8570 pounds. Between the horses and the truck was placed a standard dynamometre which was read by an observer on the truck at stated distances. Observations were made on wet and dry streets of varying grade and paved with asphalt, bitulithic, brick, cedar block, granite block, and treated wood block.

These trails all showed a fairly uniform rate of increase of resistance with grade. Except that the granite block seems to increase its resistance with grade somewhat more than the others. On wet streets the order of tractive resistances beginning with the lowest and going up is:—bitulithic, asphalt, treated block and cedar block. Wet brick pavements were not tested. The wetness of the streets seemed to show small effect on the resistive powers of the pavement.

The high place of the asphalt in the list of dry-weather records is due to, no doubt, the fact that dry weather is generally hot weather and the asphalt pavement then is rather soft, into which the wheels of a wagon would sink. On wet, and therefore cold and hard asphalt pavements the asphalt shows a very low resistance.

Rolling friction is affected largely by the width of the tires and can be materially decreased by increasing their width—a tire of 2½ inches wide causing fully double the wear of one 4½ inches wide. The only exception being in case of:

(1) Hard and uncompressible surfaces where width makes very little difference to traction, the advantage on a hard pavement being in favor of a narrow tire.

(2) Sticky and dusty surfaces, where a large quantity of mud and dust raised by the wide tire increases the draft.

A solid rubber tire offers slightly less resistance than an iron one if the road is wet and heavy, but more if the surface is hard and smooth. Pneumatic tires reduce tractive resistance from 25 to 50 per cent. in increasing proportion as the surface of the road is good or bad. The size of wheel also has much to do with tractive resistance. Acting on the principle of a lever, small wheels increase and large wheels decrease resistance, provided the diameter of the wheels is not so great, that the line of traction will be downward. The most economical size of wheel is considered to be about six feet diameter.

The effect of springs on vehicles is found to diminish the wear on roads, especially at speeds beyond a walking pace. Going at a trot they cause no more wear than vehicles without springs at a walk, all other conditions being equal.

Results of Experiments

The following are the general results of experiments made upon the resistance to traction on common roads:—

(1) The resistance to traction is directly proportional to the load and inversely proportional to the diameter of the wheel.

(2) Upon a paved or hard macadamized road the resistance is independent of the width of the tire where this exceeds from 3 to 4 inches.

(3) At a walking pace the resistance to traction is the same, under the same circumstances, for carriages with springs, and for carriages without springs.

(4) Upon hard macadamized roads and upon paved roads the traction increases with velocity.

(5) Upon soft roads of earth, sand, turf or roads fresh and thickly gravelled, the resistance to traction is very great.

(6) The destruction of the road is greater as the diameter of the wheels is less, and it is greater with carriages without than those with springs.

The grade of the road is the quantity by which it differs from the level. Theoretically all roads should be level, except a slight grade for surface drainage and where they are not so, a large proportion of the tractive force of the vehicles travelling over them will necessarily be expended in raising the load up the ascent. This resistance of the force of gravity, or weight to be overcome, is the same on all roads in any condition, and is in all cases approximately equal to the load divided by the rate of grade. That is the grade resistance on any incline in pounds per ton is 2240.

Resistance due to gravity on different inclinations:

Rate of grade	Resistance in pounds per ton
1 in 20	112
1 in 30	74½
1 in 40	56
1 in 50	45
1 in 60	38
1 in 80	28
1 in 100	22

On account of this loss of power on inclinations, it is important not to allow a road to ascend or descend a single foot more than is absolutely unavoidable.

In case of ascending a hill the road should be so located and have such cuttings and fillings as will secure a gradual and uninterrupted ascent the whole way. It is thus seen that the gradient should be as easy as possible.

On a level, smooth road the pull which a good average horse weighing 1000 to 1200 pounds can exert at a walking pace is about 100 lbs. or one-tenth of his weight. The maximum draft for a horse is about one-half his weight, but the average working tractive power may be safely taken as one-tenth. Actual experience has shown that a good average horse can draw on a level earth road in best condition a load of about 3600 pounds which is reduced on grades as follows:—

	Pounds
1 per cent. grade	2880
2 per cent. grade	2376
3 per cent. grade	1980
4 per cent. grade	1692
5 per cent. grade	1476
10 per cent. grade	936

Therefore assuming a wagon weighing 1200 pounds with a load of 1800 pounds, amounting to 3000 pounds the force of gravity on a—

	lbs.
1 per cent. grade would be approximately	30
2 per cent. grade would be approximately	60
5 per cent. grade would be approximately	150
10 per cent. grade would be approximately	300

and so on.

Steep grades are thus seen to be objectionable, and they are particularly so when a single one occurs in an otherwise comparatively level road, in which case the load carried over the less inclined portion must be reduced to what can be hauled up the steeper portion. Their bad effects are especially felt in winter when ice covers the road, for the slippery condition of the surface causes danger in descending, as well as increased labor in ascending. The correct determination of grade is of the utmost importance in road building, it is usually expressed by percentage—a 1 per cent. grade means a rise of 1 ft. for each 100 ft. horizontal.

Economy in Roads and Pavements

Good country roads and city streets possess a considerable value as upon them depend largely the development of the community. In cities and towns smooth and comparatively dustless roads are regarded as essential to the comfort and health of the inhabitants. In rural districts the conditions being so different, and ways and means entering so largely into consideration the same arguments do not apply but the monetary advantages of good roads are none the less apparent.

No enumeration of the advantages of good country roads could include all the benefits, but a few of the most evident of these may be mentioned as follows:

1. Decrease in cost of haulage.
2. Better facilities in marketing crops.
3. The marketing of produce at the most favorable times.
4. A wider choice of markets.
5. The promotion of social intercourse between members of rural communities.
6. Increase in the value of rural property by making it more accessible to cities and railways.

The effects of pavements on city life are far-reaching and important but should be considered more particularly in connection with their cost, healthfulness and appearance. Among their principal advantages may be mentioned the following:

1. Decrease in cost of transportation.
2. Increase in fire protection.
3. Establishment of a permanent grade, an important feature in all street improvements.
4. Improvement in general appearance of streets.
5. Improvements in sanitation and health by decreasing dust and mud and facilitating the cleaning of streets.
6. Advantages for social and pleasure driving.

These and many other advantages of a well-paved street enhance the value of adjoining property—which must be considered as the greatest of benefits derived from them.

The financial advantage of good roads and pavements is the lowering the cost of transportation by permitting faster travelling and the hauling of heavier loads and by reducing the wear and tear on horses and vehicles. Just what the economic value of road improvements may be depends on location, cost of improvement, and other considerations and is a difficult problem to solve. The cost of transportation to the farmer producing non-perishable products depends chiefly upon the condition of the roads, and upon the demands of general farm work.

Loam or clay roads form the most common variety in this country, are reasonably good when dry, while sand roads are in their worst condition when dry.

While it may be difficult to estimate the actual value of good roads to a community, it cannot be denied that such improvements are decidedly beneficial, but before deciding upon their design the question of ultimate economy should be gone fully into. This includes:

1. Interest on first cost.
2. Annual payments to a sinking fund for the extinction of the debt at the end of the life of the pavement.
3. Maintenance and cleaning charges.

In designing city streets pavements, there are many questions to be considered besides the first cost:

1. The kind of pavement best suited to the grades of the city.
2. The kind of pavement most easily repaired in case it has to be opened up for repairs of water-mains, gas mains, telephone conduits and sewers, or in making connections to any of these utilities, and many other considerations that have to be thoroughly gone into.

The tenders for paving about 32,500 square yards in the city of Brandon were as follows:

	Per sq. yard
Asphalt Block	$3.39
3½ in. Creosoted Wood Block	3.62
3 in. Creosoted Wood Block	3.35
Granitoid	2.55
Bitulithic	2.95
Sheet Asphalt	2.70
Roc Mac	1.70

It will be noticed that the council of the city of Brandon selected the asphalt block, as being the best suited for the heavy grades between Pacific and Princess Avenues, and also on account of being easy to repair in cases above mentioned.

It must be admitted that well-paved streets and sidewalks are essential to the social well-being of any community, that wishes to preserve its existence. Without such improvements it cannot compete with other cities thus properly equipped. The lack of pavements or the presence of bad pavements impedes the traffic, the haulage of materials, prevents street cleaning, endangers comfort and health and retards the success of the people generally.

Methods of Apportioning Cost

The three most common methods of apportionment of cost are:

1. Municipality to pay entire cost.
2. Municipality and abutting property to pay 50 per cent. each or municipality to pay one-third and abutting property one-third each side.
3. Abutting property to pay the entire cost.

There are arguments in favor of and against each of these systems of payment, but it certainly appears the most fair way that as a pavement is for the good of the general public the cost should be divided between the property owners directly benefitted and the city at large.

We have just laid down about half a mile of granite road of a thickness of 9 inches of crushed granite at a cost of 68 cents per square yard, made up as follows:

	Cents
Crushed granite per square yard	47
Labor excavating, spreading stone	19.7
Rolling	1.3
Total	68.0

I was for many years a member of a Highway Board in England, and had charge of 200 miles of roads about two-thirds of which would be macadam and one-third were gravelled roads.

The district was divided into sections of 4 miles each and we employed one man on each section, whose duty it was to go over the road each day and attend to anything that might be required. Several times in a year he would be required to take the scythe and mow the grass and cut down all weeds on the side of the roadway, open the water courses, and keep everything in proper condition. This accounts for the admirable condition of the roads in the Old Country—and we always kept the roads in proper shape by this means, doing repairs as they became necessary, and never letting the road get into bad shape.

Transportation Facilities in Canada

A Short Sketch of the Development of Railway and Canal Construction The Engineer's Tendency to Under-Estimate

At the monthly meeting of the Canadian Society of Civil Engineers, Montreal, on February 8, Mr. Collingwood Schreiber, C.M.G., read a paper entitled, "A short sketch of the development of transportation facilities in Canada." Mr. W. F. Tye, the president, was in the chair.

The first part of the paper dealt with the construction of canals, commencing in 1779, and giving details of the various waterways. Mr. Schreiber went on to describe the development of the Canadian railway system, which began with the building in 1836 of the Champlain and St. Lawrence Railway, and briefly sketched the difficulties and progress until 1870, which might be considered as an earnest commencement of railway construction in Canada. It was about this time that the Dominion Government began the construction of the Intercolonial Railway, which led in the mileage constructed in the following decade. After a reference to the C.P.R. and G.T.P. Mr. Schreiber stated that the total mileage of railways in operation on the 30th of June, 1910, was 24,727 miles, of which 8,230 miles were in Ontario, an increase of 1,530 miles; 3,793 miles in Quebec, an increase of 260 miles; 1,522 miles in New Brunswick, an increase of 65 miles; 1,350 miles in Nova Scotia, an increase of 438 miles; 269 miles in Prince Edward Island, an increase of 59 miles; 3,220 miles in Manitoba, an increase of 1,799 miles; 2,932 miles in Saskatchewan, an increase of 1,738 miles; 1,488 miles in Alberta, an increase of 546 miles; 91 miles in Yukon, an increase of 26 miles; making a total increase of 7,070 miles in the decade ended the 30th of June, 1910.

In the early days in Canada it was difficult to obtain money with which to construct the railways, especially in cases where the railways ran through sparsely settled districts and a return for the investment could not be expected for some years. For this reason, many railways were constructed of a temporary character, requiring the structures to be rebuilt in a few years. This, however, appeared to have been a wise policy, as the less the road cost in first construction, so much less revenue was required to pay dividends for some years until the country was settled and the traffic increased, when a road would be in a position to increase its capital expenditure in making renewals and improvements. Even at the present day it was, perhaps, wise in cases in which railways were being built through a country difficult of access and where immediate traffic would be light and the cost of the transportation of permanent structural material very heavy, to make comprehensive plans in the first instance for present and for future requirements, and to use the less costly and less permanent material in construction; by this means accommodation in the way of works for the immediate business would be provided, and improvements could be made and the facilities for traffic increased as the business of the road developed.

It had been determined to continue to improve the inland navigation by extending and improving the canal system since the introduction of railways in 1836. To this end a number of additional canals were built, and many of the old ones enlarged as became necessary from time to time to meet the demands of the carrying trade and the development of the country. Amongst these canals might be mentioned those forming the route from Montreal by way of the St. Lawrence River, Lake Ontario, Niagara River across the neck of land from Port Dalhousie to Port Colbourne on Lake Erie, Lake Erie, St. Mary's River, and Lake Superior to Port Arthur, the head of the great lakes.

Whilst it would be generally conceded that the railways had been the chief factor in the development of the country, no doubt the canal system had in no small degree contributed to the improved condition of the carrying trade; in fact the canals did much in the early settlement of the country towards its development before transportation by rail was even considered.

Mr. Schreiber stated that he had been identified with the railway system of the country since the year 1852, and with the construction of the Soulanges and Sault Ste. Marie Canals, as well as the enlargement of the canals, from the time of assuming the duties of the office of Deputy Minister and Chief Engineer of the Department of Railways and Canals in 1892, until his retirement from that office in 1905, to become General Consulting Engineer to the Dominion Government. Thus he very naturally had taken an interest not only in the development of land carriage, but also in the inland water transportation.

Mr. E. Marceau then, by the aid of slides, gave some interesting particulars of Canadian canals and their construction.

Mainly About Unreliable Estimates

Mr. Arthur Surveyer followed with a paper on transportation by rail and water, and Mr. F. W. Cowie, chief engineer of the Montreal Harbor, dealt with other phases of the transportation problem, having special reference to canals. He also alluded to the cost of various works as compared with engineers' estimates. Engineers, he said, could justify these extras, which were due to the enlargement of plans and scope during execution. It was becoming so well recognized that enlargements were universal that engineers should protect their reputation by adding a certain percentage to provide for all contingencies. He considered that engineers would be taken more often into higher councils if the public were convinced that their estimates were reliable.

Senator J. P. Casgrain also spoke on the discrepancy between the estimates of civil engineers and the actual cost of the work, and said there was an undoubted tendency on the part of engineers to under-estimate. Even Mr. Schreiber had under-estimated the cost of certain sections of the Transcontinental. It would save a great deal of trouble if engineers would make more accurate estimates. Engineers, continued the Senator, were too modest; they should come forward and give their opinions more freely. In Montreal the retirement of Mr. Wanklyn had awakened the public to the importance of having a civil engineer on the Board of Control. In Europe the big financial institutions employed engineers to report on various enterprises before putting money into them, but in this country Boards of Directors only consulted engineers after they had decided upon certain lines of action. He was of opinion that they might follow the European practice with general advantage.

President Tye's Views

The chairman, in alluding to the phenomenal development of Canada, stated that they owed a debt to the older generation of engineers, who had done great service in opening up the country. He agreed that engineers under-estimated the cost of works. The estimates were always wrong, not necessarily owing to the fault of the engineers, but owing to various alterations in the plans. There would be no progress if the estimates were right; engineers had to be optimistic and to make estimates in order to encourage progress. He was afraid that if the precise figures of what work would cost were given they would scare the promoters and many railways would not be built. At the same time engineers no doubt meant to give correct estimates. The reason for the increased cost of construction on the Transcontinental was the raising of the standard of the line.

Roman Influence on City Street Plans

By Charles H. Higgins[*]

Roman law dominates our jurisprudence, our language is full of its words and the Eternal City's influence on engineering is still seen in our masonry structures. But that the influence extends to the layout of an American city and reveals itself in the arrangement of streets, will be a surprise, even to most engineers.

That traces of the typical arrangement of a Roman camp are still found in Europe and Africa in the arrangement of streets of certain towns, has been recognized, notably at Silchester and Carwent in England and in Tringad in Africa. But that it may be seen in America has not, to the writer's knowledge, been understood.

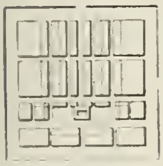

Fig. 1. Typical Plan of Roman Camp.

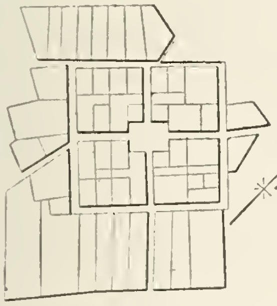

Fig. 2. The Town of Bergen, N.Y., as laid out in 1761.

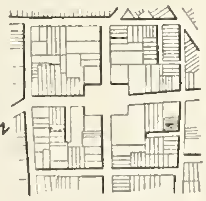

Fig. 3.—Lay-out of Property around Bergen Square, Jersey City, in 1912.

The Dutch, in the early part of the seventeenth century, settled at Communipaw and a little later—1660—founded the town of Bergen, on top of the high ridge west of the Hudson River, just south of the present Pennsylvania Railroad cut. This is now a part of Jersey City and the Summit Avenue Station of the Hudson & Manhattan electric line is but a few hundred yards from where these old Dutchmen dug their well and built their stockade, for protection from the Lenni Lenape Indians, in whose country they settled—much as the Romans built their camps in the country of the Gauls and Germans.

By the latter part of the eighteenth century, the English possessed this land. In 1764, commissioners laid out the Town of Bergen and their map has come down to us of this generation.

In Fig. 1, we have a plan of a typical Roman camp, such as Caesar describes and such as the Roman legions built each time they camped in the enemies' territory, if it were for but a night. The four gates, the broad open street inside the vallum, which surrounded the camp, the principia or main street extending directly from one side gate to another, the street at right angles to this from one end gate through the forum to the gate at the other end.

Fig. 2 shows the plan of the commissioners appointed to lay out the Town of Bergen, a plan in great measure determined, we can have no doubt, by the arrangement of the Dutch founders of a century before who had dug their well and built their stockade; and many of whose descendants still live on the spot.

Fig. 3 shows the existing arrangement of streets about what is now known as Bergen Square, Jersey City.

In each of the last two, we find the typical open marginal way or street with its four exits or entrances, the two main thoroughfares connecting these and the open space or forum at the intersection of the streets.

The analogy is so complete that we cannot but picture some old Dutch soldier—a student of Caesar, or at least of the Romans—first arranging the little new-born Town of Bergen, to resist the attack of a savage foe along the line so well proven in the centuries before. And so we have it to-day in the midst of an American city.

Three Essentials in Town Planning

Sir W. H. Lever, M.P., speaking at a conference at Manchester on the powers and duties of local authorities under the British Housing and Town Planning Act, 1909, made some interesting remarks on practical methods.

The three essentials to success in town planning were the public well-being, economy, and beauty. Without them it was a failure.

It was undeniable that the death rate in towns was invariably in proportion to the number of the inhabitants on a given area—highest where there were fifty or sixty houses to the acre, and lowest where there were only five to ten. In the United Kingdom there were two hundred thousand unnecessary deaths through overcrowding alone—more than eight times the number who lost their lives in the South African War.

In sickness the average working man was losing five weeks out of every twelve, and it was easy to imagine the awful drain there was in doctors' bills, loss of wages, and food for the family, and the consequent deterioration. Then there was the great drain in the mortality of infants at a time when the struggle between nations was not going to be decided by Dreadnoughts or naval or military officers, but in the cradle.

If a proper town planning scheme had been in operation in the large towns and cities there would have been no necessity for the great and expensive widening schemes so frequently heard of to-day. Properly carried out town planning could not only be made inexpensive, but would actually in future leave a town low-rated.

People in business tried to avoid towns with high rates, especially if they intended going into building operations or opening out new industries. Perhaps the most economical way of carrying the scheme out would be to acquire the fringe of land surrounding the town, and to do this at such times as the land was placed in the market by a willing seller, not by compulsory powers. When compulsory powers were exercised one never knew what price might have to be paid.

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In the past, in the laying out of our towns we had not done the blending together of city and park that we should have done.

Not much good would be done by going to the Continent to imitate what was done there. They must study their own country, and remember that it was the practical which was always ideal, though he did not say that the ideal was always practical. He did not believe at all in a waste of effort to produce effect. The effect would come naturally if the thing was done right, and they were doing right in limiting the number of houses to ten to twelve to the acre, in providing open spaces for children, and good wide roads with little islands for the safety of the people.

England—like Canada—"Immersed in Commerce"

Two centuries ago England led the world in town planning. In the last century and a half they had become immersed in commerce without thought of the beautiful laying-out of their towns, and everything had gone wrong and astray. When the Housing and Town Planning Bill was being introduced into the House of Commons opponents said it was very good, but should have been passed fifty years ago; that the towns were built now, and that they had spent the money and done it badly, which was one of the strongest arguments in favor of the Bill.

The town planning scheme could be best carried out by the local governing body, for they would have their own staff of engineers permanently attached to them, who would understand the district better than any outsider, and they could be aided by both business and professional men among them or in their communities.

The first thing to consider was the occupation of the inhabitants. In a residential district the arrangement would have to be different from that in a busy industrial place. The plan should always be made to fit the district. It was not wise to make a plan first and then try to patch it on to the district. Levels and contours and the points of compass should be taken.

In the case of a manufacturing district the factories and workshops should be located on low-lying ground alongside railways, canals, or water highways at the east end of the town. The prevailing winds being from the west, the smoke would then be blown away from the town. The homes should be at the west end, and on as high ground as possible. In respect of regulations the fewer limitations the better. Nothing could produce greater prejudice against a town planning scheme than for people to think their liberty would be restricted if they entered into such an area.

A radical view of the sewage works question was expressed in a paper recently read before the Manchester section of the Society of Chemical Industry (England) by Dr. Grossman, of Manchester. After speaking of the enormous (theoretical) value of the manurial constituents of sewage works, which he claims total about $200,000,000 (presumably for all of Great Britain), the author of the paper expresses the belief that sewage sludge, unless disposed of by "sound hygienic" methods, is a source of danger to the community. He also said that no process of sludge disposal can be considered satisfactory which does not make it possible to return to the soil the manurial constituents of the original sewage in a thoroughly sterilized condition. Sludge cannot be used as a valuable fertilizer unless it is free from the greasy matter which it contains, for greasy matter prevents the assimilation by plants of the manurial constituents of the sewage sludge.

Effect of Uniformity of Distribution in Sewage Filtration

At Andover, Mass., there is a sewage filter 1/200 acre in extent, consisting of 6 in. of cobble stones above pipe underdrains, overlaid with 7 ft. of stone ¾ to ½ in. in size. This receives settled sewage, which was applied in 1907 and 1908 with dashplate distributors and since then with a self-propelled traveling distributor of the Fidian type. This filter is under the observation of Messrs. H. W. Clark and S. DeM. Gage, of the Lawrence Experiment Station, and a report by them, recently published by the Massachusetts State Board of Health, gives some information on the influence of uniformity of distribution on the quality of the effluent.

As the revolving distributor could not be operated during the winter months, only the summer months, June to October, inclusive, may be used in such a comparison. During these months the amount of nitrates in the effluent from the filter averaged 0.01 in 1907 and 0.57 in 1908. During these two years sewage was applied by the dashplate distributor, about 24 per cent. of the surface receiving sewage at rates of between 50,000 and 1,000,000 gal. per acre daily, about 17 per cent. at rates of 1,000,000 to 2,000,000 gal., about 20 per cent. at rates of 2,000,000 to 4,000,000 gal., and the remaining 16 per cent. of the surface receiving sewage at 4,000,000 to 7,500,000 gal. per acre daily.

The rotary distributor was installed in April, 1909, and distribution measurements showed that about half the surface received sewage at approximately the intended rate, that is, between 1,000,000 and 2,000,000 gal. per acre daily, while about one-fourth of the surface received less than 1,000,000 gal. per acre daily, and the remaining fourth of the surface received sewage at a greater rate than 2,000,000 gal. The highest rate on any portion of the surface with this type of distributor, however, was only 3,250,000 gal. per acre daily, or about half of the maximum rate at which sewage had been applied by the dashplate system.

Immediately following the installation of the rotary distributor, nitrification increased, the average nitrates in the effluent during the following six weeks being 0.69 part, a result higher than had ever been obtained with this filter previously. The nitrates in the effluent from the filter averaged 1.09 parts per 100,000 during the summer of 1909 and 1.69 parts during the same period of 1910. This improvement in purification during 1909 and 1910 can be attributed only to the improvement in the uniformity of distribution of the sewage. The filter has been operated at approximately the same rate during the periods quoted in all four years, and, with the exception of a slight increase in strength, the character of the applied sewage has remained unchanged.

The Cost of Concrete Highway Bridges

How to Estimate the Cubic Yards of Concrete in the Slab and Girder Types—Diagrams for Figuring Cost

By B. H. Piepmeier

THE purpose of this paper is to develop a ready means of ascertaining the approximate number of cubic yards of concrete in a completed structure of a known span, height of abutments and length of wings, as well as to develop a means of making preliminary estimates of the cost of completed structures without calculating the quantities in detail.

The bridge work of the Commission requires a personal inspection of the bridge site with the local officials, and at this meeting the necessary data are obtained for the design of the bridge. Almost invariably the officials expect that an estimate of the cost of the proposed work be given them at this time. Consequently, it is desirable to be prepared to give an estimate of the proposed bridge that will closely approximate the one that is made from the detailed drawings. This is usually a somewhat difficult matter unless the time is taken to compute the number of cubic yards that will be in the bridge.

With the increased interest in concrete bridge work the past four or five years, it is needless to say that the Commission has been called upon for engineering assistance more frequently each year, until today it is almost impossible to meet all the requests. For this reason a system of standards was devised and all computations tabulated. This greatly improved the office efficiency and made it possible to answer a larger number of requests.

Again, in our office, it has been necessary to do considerable figuring to determine the best make up for a bridge. Frequently a series of small slabs on piers would sum up much cheaper than the larger spans, and vice versa. It is sometimes advisable to compare a steel bridge for the same site. With curves worked out by Mr. H. E. Bilger on the cost and the number of cubic yards in substructures for steel bridges, we are able to get a very accurate estimate of the cost of a steel bridge complete. It, therefore, became desirable that some ready means be devised for determining the approximate number of cubic yards in concrete slab and girder bridges, for both office and field use.

From the larger number of computations we have made of various concrete bridges, it was thought possible that a complete tabulation of quantities or a system of curves could be worked out that would enable one to determine readily the contents of either the slab or the girder type of bridge. It is proposed, therefore, to correlate all computations and data on the flat top type of bridge, and to arrange it in a convenient form for both office and field use in determining the number of cubic yards in ordinary bridges, besides obtaining an approximate estimate of the cost. Before proceeding, however, it may be well first merely to outline in a general way the slab and the girder bridges as designed by the Illinois Highway Commission, and give a few dimensions that you may better understand the types of bridges under consideration.

Slab Bridges—For reinforced abutments for slab bridges the main wall is made 12 inches thick from top to bottom, the steel reinforcing being placed on the stream side, and the percentage of steel increased as the height increases. The abutments rest on an 18-in. reinforced footing, which is made of sufficient size to allow but 3000 lb. per square foot bearing on the foundation. When a soft foundation is encountered, this same size footing is usually sufficient to permit the proper spacing of the required number of piles.

The reinforced wings for slab bridges are of the standard cantilever type, the base being 33 per cent. of the total height. The wing wall proper is 12 in. thick for heights up to 16 ft. For greater heights the base of the wall increases in proportion to the height. Nearly all wings for this type of bridge have a drop of 18 in. to 5 ft. at the end to conform to the 2 to 1 slope on the sides of the road. I may say here that the cantilever type of wing for extreme heights has been found much more satisfactory than the buttress type, as the increased thickness at the base and the large percentage of steel does not equal the extra cost of forming necessary for the buttress type.

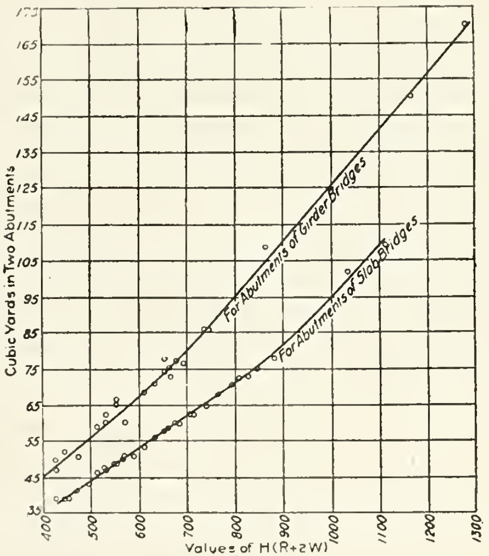

Fig I

Reinforced concrete slab bridges are designed with various roadways, ranging from 16 ft. upward. The side rails usually average 8 in. thick and 3½ ft. high. On this type of bridge the slab and the side rails come flush with the back of the abutment walls. The top of the wings comes up along the outside of the rails to catch the side slope on the road. In determining the thickness of the slab, its entire dead load is considered, the load of the cushion wearing surface, and a 24-ton engine live load. Excluding temperature stress, the steel is figured at 12,000 lb. per square inch; the compression in the concrete is assumed at 800 lb. per square inch.

Girder Bridges—For the reinforced abutments for girder bridges, the general type is the same as that

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Before the Illinois Society of Engineers.

for the slab bridges, with the exception that all abutment walls proper are 18 in. thick, and the width of base for the wings is 40 per cent. of the total height. The extra thickness in the abutments is for bearing of the girders. The extra width of base under the wings is for stability, as the wing walls are cut away from the abutment walls proper by a 1-in. partition to allow for expansion of the superstructure. They can, therefore, receive no support from the abutments, as is the case with wings on slab bridges. The wings on this type of bridge also come up on the sides of the girders and drop several feet at the ends to follow the general side slopes on the road.

The reinforced concrete girder superstructures are designed with roadways from 16 to 30 ft. The roadway usually required is 16 to 20 ft. The side girders average from 4 to 6 ft. in height, and 16 to 30 in. wide on the top. On the side girders there are heavy depressed panels to lighten the web and to give the proper appearance to the finished bridge. The floor slab and side girders on this type of bridge also extend to the back side of the abutment wall. The floor slab is designed to carry its own dead load, the cushion wearing surface and a 24-ton engine live load. The side girders are designed to carry the entire dead load of the superstructure, plus a live load of 125 lb. per square foot on the roadway, or a 24-ton engine, whichever gives the greater moment.

Abutment Diagram—For the purpose of determining off-hand the approximate yardage in a pair of reinforced abutments for either slab or girder bridges, Fig. 1 has been prepared, and is applicable within the specific cases used. For abutments of slab bridges, 40 different designs were taken from the files of the Commission, and the number of cubic yards in the two abutments of each design was plotted against H (R+2W), where H is the distance from the finished roadway to the bottom of the footings, R is the clear roadway of the slab bridge, and W is the length of one wing measured on the stream side. R was taken as the clear roadway of the bridge, as this figure is always secured at the preliminary inspection of the bridge site. W, the length of the wing, can always be assumed in the field or computed in the office, knowing first the general conditions of that bridge site.

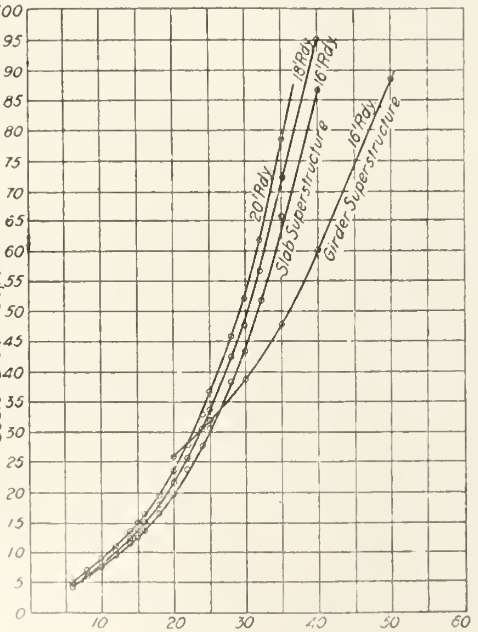


Fig.2

It will be noticed that the number of cubic yard in the two abutments varies approximately as the height of the abutments; also, that the maximum deviation from the curve does not exceed 2 cu. yd., and more often it is less than 1 cu. yd. In fact, for heights of abutments up to about 16 ft., or where H (R+2W) does not exceed 900, the quantities so plotted follow practically a straight line, and might be represented by the straight line formula, cubic yards=0.09 [H (R+2W)]—1.37, which often is convenient when the curve sheet is not at hand.

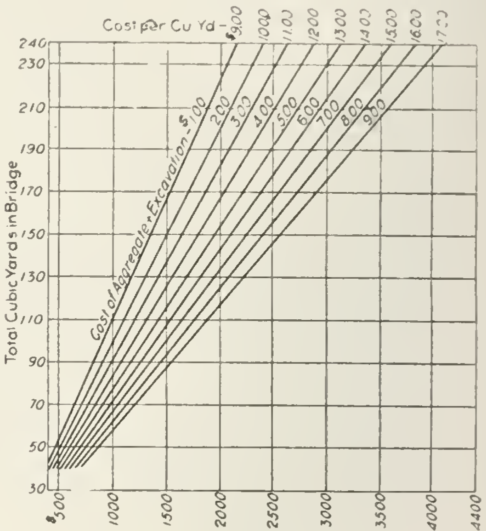


Fig.3

For a particular bridge, suppose the distance from the crown of finished roadway should be carried 4 ft. below bed of stream. Then H=14 ft. Now assume the wings are each to be 13½ ft. long, and that the finished bridge will have a 16-ft. clear roadway. We have now H (R+2W)=600, the value to be read at the bottom of Fig. 1.

It will be seen by locating the point on the curve and going across to the left-hand side that there are about 53 cu. yd. in the two abutments. Where the quantity at the bottom of curve exceeds 900, we readily see that the curve begins to rise above the straight line. This is expected, as abutments exceeding 16 ft. in height have the base of the wings spread to allow for the proper percentage of steel. This extra width of base is added to the back of the wing wall by a batter, the batter extending up from the footing 4 to 8 ft., according to the height of the wall. This batter does not extend to the top of the wall, as the drop at the end of the wing would increase its thickness at the end, and this does not give the best appearance to the finished bridge. The abutment walls remain 12 in. thick up to 21 ft. high, and from there on the thickness increases as the height. The slight variation from the curve in solving specific cases may be attributed to the difference in the angle of the wing with respect to the abutment, and the difference in width of footing for bearing. The more nearly the direction of the wing approaches a parallel with the center line of the road, the higher will be the wing at the end, thereby increasing the number of cubic yards, but as the corner formed by the intersection of the abutment wall and wing is measured twice, these two quantities tend to compensate one another.

For the reinforced abutments on girder superstructures 25 designs were taken from the files of the Commission, and the number of cubic yards in the two abutments plotted against H (R+2W), the notation being the same as before.

It is to be noted here that the number of cubic yards is somewhat greater than the number of cubic yards in the abutments for slab bridges. This is due to the extra thickness of the abutment walls proper, to give the desired bearing and the extra width of footings under the wings. It will be noted on this curve that some of the specific cases used had a wide variation from the mean. This can be attributed to the fact that some of the abutments had extremely long wings that were level on top and also the different length of spans requires a little different width of footing under abutments to take the required bearing. A curve of this kind could not take into account all of these conditions, and while several points fall several yards off the curve, the mean is close enough for the purpose that it is to meet.

For a particular case, take the same dimensions that were considered before; clear roadway, 16 ft.; height, 14 ft., and length of wings, 13½ ft. We now have 600 to read off at the bottom of Fig. 1. Getting the intersection with the curve for girder spans, we find that the two abutments contain 67 cu. yd. instead of 53 cu. yd. in case of the slab span, a difference of 14 cu. yd. in favor of the slab bridge. Fig. 1 then is a ready means of comparing the substructures of the two types of concrete bridges and to determine the approximate number of cubic yards in each.

Superstructure Diagram—The next thing of importance is to determine the number of cubic yards in the superstructures of the two types of bridges. For this, Fig. 2 has been prepared, and is applicable for the flat top type of bridges up to 50 ft. in span. For slab superstructures 48 designs of different roadways and spans were taken from the files of the Commission, and the total number of cubic yards in the superstructure was plotted against the clear span length, the curves drawn through the points having 16, 18 and 20 ft. roadway. The three curves will meet the requirements of the majority of highway bridges. Occasionally a special case arises, such as a skew or extra wide roadway, and then it is necessary to make special computations to determine the number of cubic yards.

For a specific case, assume a bridge to have a 30-ft. clear span and 16-ft. roadway. We readily see the number of cubic yards to be about 43.2.

We may wish to consider for the same site the 30-ft. girder type with 16-ft. roadway. Here we see that the number of cubic yards is about 38.6, or a difference of 4.6 cu. yd. in favor of the girder superstructure. But you will notice for the same height substructure the difference in all cases is in favor of slab bridges. If it should happen that for a single span the girder bridge and the slab bridge should have the same yardage, an advantage still rests with the slab type, as it has been found that contractors usually bid more favorably on this type. There is also another very important point in favor of the slab type. If for any reason there should be any defective material placed in the rail, or poor alignment in its construction, it may be torn down and replaced without disturbing the floor, even after the falsework has been taken down.

Cost Diagram—Having found the expression that is the measure of the number of cubic yards in the abutments and superstructures of concrete slab and girder bridges, the next step is to combine the quantities with a unit price that we may determine the approximate cost of each type. For this purpose Fig. 13 has been prepared.

It has been found from the cost data of a large number of slab and girder type concrete bridges built under the supervision of the Illinois Highway Commission, that it is possible to get a very close figure on each individual item that goes to make up the cost of the bridge; first, the cost at the bridge site of sufficient cement to make 1 cu. yd. of 1:2½:4 concrete; second, the cost of the necessary lumber for forming 1 cu. yd.; third, the cost of reinforcing steel per cubic yard of concrete; fourth, the labor cost in mixing and placing 1 cu. yd. of concrete; fifth, the cost of sufficient aggregate to make 1 cu. yd. of concrete; sixth, the cost per cubic yard of concrete to make the necessary excavation to start the concrete of the footings. The two items that largely control the cost of a structure of this kind are the excavation and the necessary aggregate for the concrete. We find that the cost per cubic yard of concrete for cement, forms, reinforcing steel, and the mixing and placing, have narrow limits in their variation.

It therefore appears possible that some definite quantities may be fixed to the first four items and a curve plotted for the last two, combining them in such a way that the total cost may be readily determined after we have learned the number of cubic yards in the bridge.

The cost at the bridge site of sufficient cement to make 1 cu. yd. of concrete for a 1:2½:4 mixture may vary from $1.75 to $2.10. While the price of cement, the distance it has to be hauled, and the amount required for some aggregates, vary slightly, the extreme variation would not be over 20 cents per cubic yard from the average. From a general average of all cost data on this item, it would seem that we are probably safe in choosing for cement about $1.90 per cubic yard of concrete.

The cost of forms includes all the necessary falsework, bracing and form lumber for completing the bridge. While this item varies somewhat for different localities, and will vary again where the contractor can use some of his old lumber, it will fall between the limits of 75 cents and $2.50. Experience has shown that about $1.50 for ths ordinary type of bridge is usually sufficient and might well be chosen for this cost curve.

The reinforcing steel varies from 50 lb. per cubic yard for substructures to 170 lb. per cubic yard for superstructures, or an average of about 110 lb. for the two combined. This steel delivered at the bridge site under ordinary conditions will cost about $2.10.

The item for mixing and placing concrete might vary from $1.50 per cubic yard for crushed rock concrete mixed by hand to possibly as low as 40 cents for gravel concrete mixed by machinery. This item should also provide for the necessary work in spading the concrete next to the form and securing the desired finish. In spite of the possible wide variation, we find the cost of this item varies but little from the fixed amount of $1.25. While all these quantities given above may seem somewhat in doubt as to their reliability, yet experience has determined that they are not far from the correct figures for normal conditions on the average bridge.

The item of excavation, which includes also cribbing, sheet piling, pumping, and all necessary work to start the concreting of the footings, has been found from the cost data on file to vary from 50 cents to $5 per cubic yard of total concrete in the bridge. The 50 cents per cubic yard is found only in some very favorable cases and on the smaller spans, where there is practically no cribbing, sheeting or pumping necessary. On the other hand, the cost of $5 per cubic yard of concrete is caused by a soft, seepy soil where cribbing, sheet-piling and excessive pumping are necessary. Quite often the wide variation in the item for excavation is due to poor management on the part of the foreman in charge. This item, therefore, may vary considerably, but with experience with the excavation that is to be handled and with the type of bridge that is to be built, one is able to estimate this item sufficiently close for all practical purposes.

It will be seen that the cost of the aggregate delivered to the bridge site is the second item determining the price per cubic yard of concrete. Under the most favorable conditions with respect to location of a satisfactory aggregate supply, it would likely cost at least 50 cents per cubic yard to haul it to the mixing plant. On the other hand, the cost aggregate at the bridge site might exceed $4 per cubic yard, as the structure may be isolated from a railroad station, and it may be necessary to ship in either gravel or crushed rock and sand, besides hauling it several miles into the country.

In the light of the wide range on these two items, Fig. 3 has been prepared to give the total cost of the bridge complete, including profit to the contractor under conditions where the cost of excavation, plus the cost of aggregate at the bridge site, might vary from $1 to $9.

For a specific case, we will assume that a concrete bridge has 120 cu. yd. of concrete. We will next investigate the condition of the foundation, and assume the cost for completing this part of the work, and express it as so much per cubic yard of concrete. We then approximate the cost of delivering at the bridge site the necessary aggregate to make 1 cu. yd. of concrete. For convenience let us say that these two quantities amount to $3 per cubic yard of concrete. Entering Fig. 3 with 120 cu. yd. at the left-hand side, and following this across to the $3 curve, or the $11 per cubic yard, which is the same thing, and then to the bottom of the figure, we find the cost of the bridge complete to be $1,300.

From the figures heretofore given, we are able to determine approximately the number of cubic yards in either the slab or the through girder type of bridges, besides having a ready means of determining the probable cost. While the curves here developed apply only to the slab and through girder types of bridges, similar curves might readily be developed for the deck girder, the through girder floor beam type, or the arch, and would prove of equal service to the highway engineer, but their development is beyond the scope of this paper.

The foregoing is not intended to supply a substitute for engineering ability, but rather to furnish an aid that will safely direct the engineer who will interpret with judgment and experience.

The Edison Idea Improved in Canada

A visior to Toronto last week was Dr. Roughsedge, of the Ottawa Concrete Homes Company, Limited, who told a representative of the Contract Record that excellent results had been obtained in the work described in our issue of January 31. A few days ago Dr. Roughsedge paid a visit to New York and examined a number of concrete houses that are being built on Long Island. Dr. Roughsedge took his superintendent of construction with him and as a result of that visit is confident that the Roughsedge moulds are capable of even better results in house building than have been claimed for them. He contends that the work already done is better than the finished product of the Van Guilder or Morrill systems, concerning which there has been so much discussion on the other side. The occupants of the homes at Long Island are most enthusiastic about them and Dr. Roughsedge told the writer an amusing story of how he tried to "buy" one and was asked an extortionate price.

The houses that are being erected by The Ottawa Concrete Homes Company, Limited, will be built of poured concrete and will have perfectly continuous cavity walls. The company is going into the matter thoroughly with a view to producing variations in design and finish so as to make them attractive not only from a utilitarian standpoint but also from that of artistic appearance. Dr. Roughsedge is satisfied that with a few minor improvements to the moulds the houses constructed under this system will be so acceptable that within five years they will come into general use throughout the country.

Features of an Interesting Municipal Contract at Pointe Claire, Que.

Messrs. Laurin & Leitch, Montreal, have secured a contract for a water, drainage, and electric lighting plant at Pointe Claire, Que., designed by Mr. V. Dupont, Montreal, at a cost of $105,000. The water is to be taken from a point in the St. Lawrence through a 10-inch suction pipe and pumped to a steel standpipe. The pumping station will be of solid brick, 46 x 22 feet inside measurement, and will contain two pumps of 500 gallons per minute each, one driven by steam and the other by electricity. In addition there will be two low pressure pumps for pumping the water from the river into the filter. This will have a capacity equal to the discharge of one pump. The installation will have a capacity of nearly a million and a half imperial gallons per 24 hours. When pumping directly into the system it will be possible to obtain a pressure of 86 lbs. per square inch and a supply of water of about 1,000 gallons per minute. By running the two pumps, fire protection will be ample for many years. The water will be treated with chloride of lime. It is proposed to place the waterpipe in the same trench as the sewer. Steel pipe will be employed throughout the system.

The sewage system, known as the separate plan, provides for the sewage being dumped into a sedimentation tank, which will require two pumps run by electricity, one being in constant operation. The solid matter will be collected in the tank, and the liquid, before passing to the river, will be treated by the chloride of lime process, thus being further purified. A large number of manholes have been provided to facilitate the ventilation and cleaning of the sewers. Special connections will be made opposite each house. The water, after being treated, will be discharged into the St. Lawrence, 500 feet from the shore. The sewage pipes vary from 6 to 18 inches in diameter.

The street lighting is on the series Tungsten system, the lamps being placed 100 feet apart. The same current will be used to run the sewage pump and the turbine pump for the waterworks.

Steel Sheet Piling in Contract Work

Some Practical Observations by Mr. J. R. Wemlinger—Method of Installation in Various Kinds of Coffer-dam Construction

IN our issue of January 24, 1912, we reproduced a valuable paper on the Construction of Cofferdams, given by Mr. W. D. Lockwood before the American Society of Engineering Contractors. In the discussion which ensued, Mr. J. R. Wemlinger gave a particularly interesting and practical review of the uses and advantages of steel sheet piling in this class of work. Mr. Wemlinger's observations are given below:

One of the faults of wood sheet-piling is that the units thereof have no cohesion or bond and therefore, if for some reason the structure in which they are used is forced away from its original position, as it often happens in cofferdam construction, they are easily separated. Of course, as soon as this happens a portion of the cofferdam is endangered and, unless heroic means are employed, destruction of the entire dam soon follows. As stated by Mr. Lockwood, no other features of cofferdam construction is of greater importance, although it is only too often disregarded, than that of flexibility which is that element in the construction that will allow it to adjust itself to inequalities that arise after completion of the work or to sudden and unexpected stresses due to rise of water, floods, undermining or other causes.

Let us consider the elements or parts which cooperate to form a cofferdam. In one case, they consist of sheeting or sheet piling, walings, and piles; in another they are cribs, walings, and sheeting; again, these parts may be A-frames covered with planking. Whatever these elements may be, the sheeting or sheet piling is the one thing which is depended upon to hold back the material surrounding the cofferdam. This material may be a bank of earth that furnishes resistance to the passage of water, or it may be the water itself, or it may be quicksand. In either case the work can not be carried on satisfactorily inside the coffer unless such material is kept out. The other portions of the cofferdam, not being so closely related between themselves as the units of sheeting, may suffer considerable displacement or distortion without endangering the structure. The sheeting, however, for the reason above mentioned, must be limited to a very small amount of change in position, that is, of course, assuming that wood is used for this portion of the work. With steel sheet-piling the original alignment can be modified to a comparatively great extent without the least danger to the structure of which it forms a component part.

The prime importance of the sheeting or sheet-piling being thus made evident, it follows that very careful consideration should be given to this element. The first cost is only too often the principal question with many contractors; they losing sight of the fact that the defects of the cheaper material are quite liable to cause delay and expense far above that of the additional cost of the higher grade material.

Steel sheet-piling is more expensive, at the start, than wood sheeting, but it always has a salvage value which helps greatly to decrease the difference in cost. However, aside from that consideration, it is that fact emphasized before, i.e., flexibility, which, in my opinion, is of utmost importance in the planning of cofferdam construction and that should point to the advisability of steel sheet-piling. This material has heretofore been used in so many cofferdams and so successfully under most trying conditions, that it deserves a foremost position in any discussion relative to this most widely required form of protection for excavations of all kinds.

Mention has been made of two memorable installations of very large cofferdams satisfactorily built of steel sheet-piling, installations that would prove to be exceedingly costly, if not impossible, by other methods: the Black Rock Harbor cofferdam, at Buffalo, N.Y., and the big elliptical cofferdam around the wreck of the U. S. S. "Maine" in the Havana harbor. In both cases, the reliance placed on the flexibility of the steel sheet-piling was given ocular and convincing proof.

Although these are wonderful installations that compel world-wide attention, nevertheless, they are of secondary importance in the consideration of general types of cofferdams used so largely in ordinary practice. We are, necessarily, more concerned with the machine or tool which finds some application in every day use, than we are in the exceptional implement, much as it may excite our admiration for the time being. Therefore, I shall not further refer to such exceptional structures, but will attempt to show how steel sheet-piling can be used for the simplest form of cofferdam and may be installed by means of such equipment as is usually possessed by the average contractor.

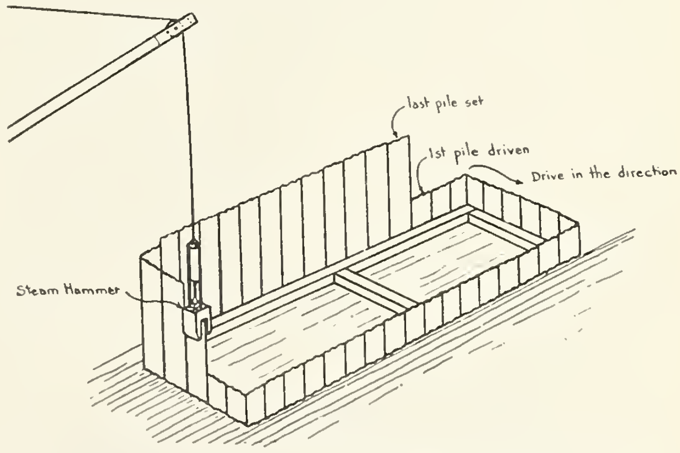


Fig. 1—Method of installing Steel Sheet-Piling Coffer-Dams for bridge piers or other foundations

Ordinarily, steel sheet-piling may be placed in the same manner that wood sheeting is usually driven, except for one important difference. While wood sheeting, in most cases, can not be driven ahead of the excavation, steel sheet-piling, on the other hand, may always be driven well in advance of the digging and may thus be made to extend any convenient distance below the bottom of the coffer, provided, of course, the material to be excavated is not rock or boulders too large to displace easily. The fact that steel sheet-piling may thus project well below the grade of the excavation is a great advantage. If the foundation of the pier or other structure to be erected inside the coffer, rests on sand or other loose soil, as it often does, the sheet-piling extension or cut-off effectually prevents the "blowing in" or "boiling up" of the loose through the bottom of the excavation caused by the hydrostatic pressure on the outside of the cofferdam.

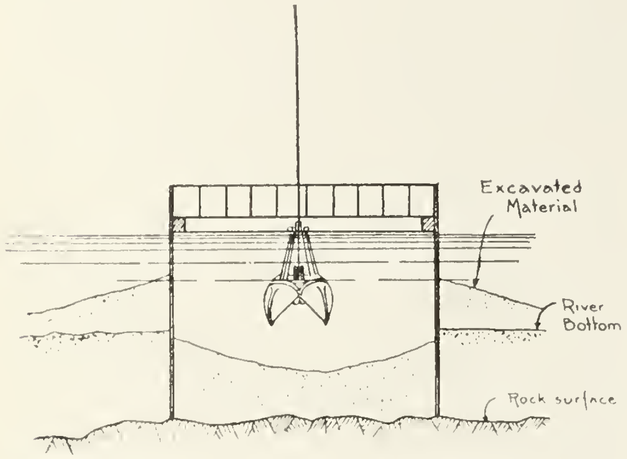


Fig. 2—Excavating interior of Steel Sheet-Piling Coffer-Dam by dredging with bucket

In almost every case, the steel sheet-piling coffer can be completed before any water needs to be pumped out, with the assurance that it will be found safe and sound later when the excavation is completed. The expense of pumping while wood sheeting is being placed in timber cofferdams is an item which can not be disregarded and which should be applied to the purchase of the more reliable steel sheet-piling.

A simple and economical method of installing steel sheet-piling cofferdams in moderate depths of water is illustrated in Fig. 1.

The sheet-piling is first placed in the desired position and the whole coffer set up before it is driven to grade. A wise precaution, however, is to drive the sheet-piles forming the up-stream end of the box sufficiently to hold them securely, especially if the stream is swift. After all the sheet-piling is in position, the interior top bracing is placed and the driving of the sheet-piling completed. Instead of placing the sheet-piling first, a frame of wales and braces of the required size may be floated in position and secured there by fastening it to four piles previously driven at the four corners, after which the sheet-piling is set up around this frame.

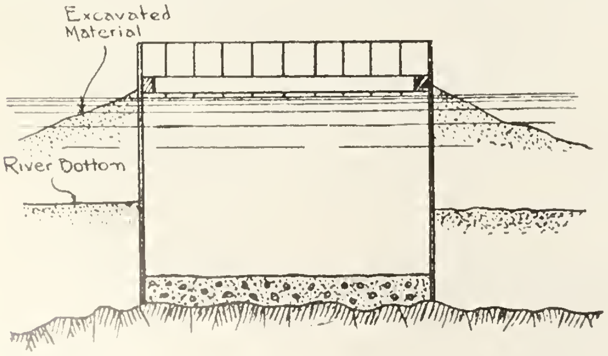


Fig. 3—Steel Sheet-Piling Coffer-Dam with concrete seal deposited under water

In either case, the procedure to follow in the driving of the steel sheet-piling is the same. Each pile is driven in succession by means of wood mauls or, preferably, by using some type of steam or air hammer as the latter are more economical and more satisfactory in the end. If the depth of soil to be penetrated by the sheet-piling is only a few feet, the piles may each be driven to grade in one operation, but, if the depth of penetration is more than eight feet, it is better to drive them at the rate of four to six feet at a time all the way around. If the hammer is suspended over the piles by means of a derrick, as shown in Fig. 1, rapid progress can be made even though each pile must be driven more than once. The latter method absolutely ensures a continuous and plumb line of sheet-piling, and a staunch enclosure. If a sheet-pile of any kind is driven any considerable distance ahead of the following ones, there is great risk that it may be deflected to an extent sufficient to seriously interfere with the proper closure of the coffer.

Having thus completed the cofferdam, the material may be excavated in the usual manner, by pumping out the water and removing the soil by any ordinary method. A better way, however, if the space inside the cofferdam will permit, is to dredge out the river bottom by means of a clam-shell or orange-shell bucket, or it may even be removed by a suction pump if of such character that will permit it to pass through the latter.

Fig. 4—Corrugated Steel Sheet-Piling Coffer-Dam for Sewage Disposal Works, Ocean Grove, N. J.

Fig. 2 shows how the dredging may be done with an orange-peel bucket operated from the same derrick used previously to carry the hammer. If the bottom of the excavation does not need to extend to rock, the excavation or dredging may be completed without once pumping out the water, and a layer of concrete two or three feet thick deposited under the water and allowed to set, as shown in Fig. 3. After this has sufficiently hardened, the water is pumped out and the pier or foundation completed without any danger from upward pressure on the bottom which might cause it to blow out.

If the excavation must be made to rock, the material within the coffer may be excavated in the same manner, but before the concrete seal is laid on the bottom, it may be necessary to pump out the water so as to allow the cleaning off the rock surface. However, after this is done, the water may again be allowed to fill the interior and the concrete deposited as in the previous case, thereby avoiding the necessity and cost of keeping the cofferdam dry while the concrete is deposited, and eliminating the additional expense of a drain and pump to relieve the hydrostatic pressure on the concrete while it is setting.

As regards the disposition of the excavated material, an excellent thing to do with it is to dump it on the outside of the cofferdam, as shown in Fig. 3, provided, of course, the location permits of this disposition of the soil removed from the interior. The bank of earth thus accumulated against the sheet-piling, not only prevents scouring alongside of the latter and probable undermining of the coffer, but it is also of great value in decreasing serious leakage into the same when the sheet-piling extends to rock and, therefore, can not be depended on to seal the bottom because it does not extend below it.

If a force pump is available, the steel sheet-piling may be jetted in position with advantage and economy, if, of course, the soil is such that a water jet will penetrate and loosen it up. Fig. 4 shows the interior of a cofferdam for which the sheet-piling was installed in this way. The depth of excavation was twelve feet, and the sheet-piling was fifteen feet long. The entire excavation was in very wet fine sand, and the sheet-piling extended three feet below the bottom. This prevented the boiling up of sand and, as will be noted in the picture, made it possible to keep the bottom very dry. In this case all the concrete was laid in the dry since it was found very easy to keep the excavation free of water with a six-inch centrifugal pump, although the cofferdam was about 60 x 100 feet. The sheet-piling was so tight that not enough water leaked through it to wash off the sand that adhered to the metal.

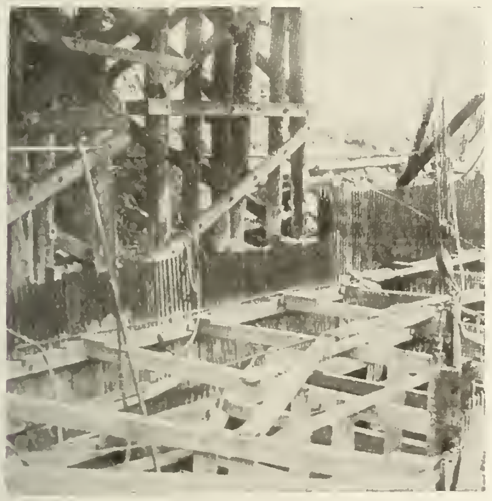


Fig. 5—Corrugated Steel Sheet-Piling Coffer-Dam for abutment of bridge across N.Y. State Barge Canal at Lyons, N.Y. on the West Shore Railroad

Fig. 5 shows a cofferdam for a bridge abutment in which all the sheet-piling was driven completely ahead of excavation, by means of the small steam hammer shown at the right of the picture.

By the use of mica, concrete work is said to have been made that bears a strong resemblance to granite. For surfacing concrete it has proved very effective. About five pounds of mica is sufficient to cover 100 square feet. The electric light columns in Lincoln Park, Chicago, were treated in this way. Crushed red granite was used with the mica, so that the finished surface has the appearance of polished granite. The granite and mica surfacing material were applied to the inner surface of the square iron trough in which the columns were cast, and after their removal the posts were scrubbed with mica, which removed the sand from the surface of the mica particles, when the surface showed a close resemblance to granite.

The Cement Gun in Hawaii

The "cement gun," described in detail in a recent issue of the Contract Record, is being used by the Quartermaster's Department, U. S. Army, in the Hawaiian Islands, and is proving of much value in construction. The apparatus was originally provided with a nozzle that became worn and clogged easily. These difficulties were overcome when Captain Edwards, quartermaster, invented a rubber-lined nozzle that gave complete satisfaction. The following description of the device as used in Hawaii is furnished by Captain A. B. Putnam, Corps of Engineers:

"The cement gun is manufactured by a New York company, and consists of an air compressor, a 4-cylinted marine gasoline engine of 20 horse-power, a 1-inch wire-bound rubber hose with walls ⅜-inch thick for delivering dry sand and cement mixed, an ordinary garden hose for delivering water to the nozzle of the gun, and the gun or nozzle itself.

"The nozzles originally furnished with the machine were not rubber lined, and soon became abraded, so as to render them worthless. The nozzle used by Captain Edwards is lined with rubber (about three-sixteenths inch) so that no mortar sticks within. Furthermore, the rubber lining does not appear to become worn under use except very slowly. A mixture (1 to 2½) of cement and fine sand is delivered to the nozzle at 30 lbs. pressure, and just before being discharged is met by a circular spray of water at 30 lbs. pressure within the nozzle, so that the wet mortar is projected on the surface to be covered. The water supply is regulated at the nozzle to obtain the correct consistency.

"Triangular mesh is secured to the studding of the structure, and is backed up by either heavy paper or wood placed so that the mesh will be in the centre of a mass of stucco, 1¼ inches in thickness when the spraying is completed. In dwelling-houses the stucco is placed on the studding inside as well as outside, but is made only about ¾ inch thick inside. Smoothing is done by shooting a fine light spray of wet mortar. No finishing is done with the trowel. The finished surface inside is to be painted. The resulting stucco is very hard and has a fair appearance, though it is necessarily rough. So far, provided the mesh is placed so that the edges overlap, I have observed no cracking. It should be noted that this stucco is merely a thin wall of plaster, and bears no strain except that due to its own weight. When stucco is placed inside and outside, the paper backing (10 lbs. per 100 sq. ft.) is left in the wall. When only an outside is placed, the wood or paper backing is removed when the stucco has hardened.

"At date of writing one gun is placing 90 sq. yds., 1¼-inch thick, per working day. The cost at present, including cost of studding and backing in place, is $1.13 per sq. yd. The hose now in use is stronger and heavier than the one supplied with the outfit, and the nozzle is different, being about 12 inches long, as against about 4 inches as supplied, and being rubber-lined throughout, so that the mixture never touches metal. There has been but little work done here as yet, so that cost data are not complete."

Promoting Municipal Employees

Entrance Salaries and Increases—Methods of Regulation—Value of Efficiency Records

One of the most difficult problems connected with the reformation of the control of municipal work is that of securing and retaining a competent force of officials and employees, objections being found to the operation of the civil service method in many cities and to that of political influences in all cases, we believe. It is difficult to see why, in this respect, a city could not and should not be conducted along the same lines as a large private corporation, says the Municipal Journal. Managers of such corporations find the same difficulties as are experienced by the managers of municipal departments.

A short time ago a large private corporation in New York City appointed a committee to provide a system for regulating the salaries and promotion of its employees, and a circular of instructions for this committee were prepared by Leonhard Felix Fuld, examiner of the Municipal Civil Service Commission of New York. An outline of the system recommended by him, nearly if not all of which would be applicable to a municipal department, was prepared. These instructions he divided into eight heads, namely, census of employees (for the purpose of preparing a condensed and authentic statement of present conditions), determination of titles, determination of entrance salaries, increase in salaries, promotions, promotion board, and efficiency records. Under the first head it is proposed to take a census of all employees by having each furnish on a form the following information regarding himself:

(a) Name and address.

(b) Date of birth.

(c) Date of original entrance into service of corporation.

(d) Present annual salary.

(e) Present title.

(f) Department or bureau in which employed.

(g) A full and complete descriptive account of the duties actually performed by the employee at the present time.

This form will be on a card, and the card, when filded out and before forwarding it to the committee in charge of the matter, will be endorsed by the head of the department or bureau, with a statement that the employee to whom it refers performs his duties as efficiently as, more efficient than, or not as efficiently as the majority of employees in his department or bureau. If it is his opinion that the employee performs his duties more efficiently than or not as efficiently as the majority of employees in his department, he must also give a specific statement of the reasons for his opinion. The auditor's office will also endorse on each card the date on which the emyloyee was first employed by the corporation, his entrance salary and title, each date on which his salary was increased or decreased, the amount of his salary in each case, and his official title in each case.

The committee will then prepare a skeleton organization plan showing the various positions occupied by the empleyees of the corporation. Titles will be selected for all employees, which will be descriptive of the duties performed by the incumbents. The plan will also show the line of responsibility running from the employees in a subordinate position to those acting in a supervisory capacity.

The committee will fix the entrance salary for each position in the service of the corporation. It will study carefully the salaries paid by other corporations for similar grades of work, and be careful not to make the entrance salaries higher than those paid by other corporations. (As a rule, a high entrance salary does not attract into the service of a corporation the most desirable employees. Better employees are secured by a fair entrance salary, coupled with the prospect of certain and rapid promotion when the employee has mastered the duties of his new position.) The corporation will grant an annual increase in salary of 10 per cent. of the entrance salary to every employee who has during the preceding four quarters of the year received a meritorious rating on his efficiency record. No employee will receive more than ten such increases in any single position, and no employee will be required to take any examination for such an increase in salary.

A promotion from a lower to a higher position, where such promotion involves a distinct change in the duties to be performed by the employee, will be allowed only after a competitive examination. In such a promotion examination the seniority of the employees, their efficiency records, and their fitness for the higher position, as determined by the written examination, will be given consideration.

A promotion board is provided consisting of the president, one director and the superintendent. (The personnel of this board would naturally vary according to the subdivision of the executive and administrative duties in the city in question.)

The committee will establish a system of contemporaneous efficiency records for all employees in the service of the corporation. These records will be used in connection with salary increases and promotion examinations. Entries in these efficiency records will be made quarterly. Each head of bureau or department will at the end of each quarter submit to the promotion board a report on the efficiency of his employees. In this respect he will divide his employees into three classes: those who have performed satisfactory work, those whose work has been distinctly above the average of the employees in his department, and those whose work has been distinctly below the average of the employees in his department. In the case of employees who are considered either above or below the average of the department, the reporting officer will give a special statement of his reason for the opinion expressed by him. The promotion board will rate the average satisfactory employees B, the employees who are above the average A, and the employees who are below the average C. Employees who receive a rating of A for four consecutive quarters will, at the end of the fourth quarter, receive an increase in their salaries amounting to one-tenth of their entrance salary, without examination. Employees who receive a rating of C in any quarter will be notified by the promotion board that if they receive a rating of C at the end of the next quarter their services will be dispensed with.

In determining the efficiency of their employees, heads of departments and bureaus will consider the quantity of their work, the quality of their work, their general conduct, their capacity for initative, and their punctuality and attendance. The promotion board may disregard the recommendation of a reporting officer with reference to an A or C employee when the reasons assigned by the reporting officer are, in its judgment, insufficient.

Claywokers' Record Meeting at Toronto

Leading Trade Experts discuss Practical Topics and Consider Means of Promoting Welfare of Industry—A Representative Gathering

THE annual convention of the Canadian Clay Products Manufacturers' Association, which was held at the Prince George Hotel, Toronto, February 14-16, will stand for a year at least as the largest and most successful in the records of that progressive body. The attendance was most representative and numbered about eighty, or one out of every eight manufacturers engaged in the business in the country. There were members in attendance from such business points as Calgary, Portage la Prairie and the Maritime Provinces. The reports presented by the president, secretary and treasurer showed that excellent progress had been made during the past year, that the finances of the Association were in a satisfactory condition and that the membership was increasing. The programme arranged for by the Executive Committee was in many ways the best yet offered to the Association. Gratifying response had been made to the request for addresses, and the discussions which ensued were most informative.

On Wednesday, February 14, the opening day, addresses of welcome were given in the afternoon by the acting-president of the Association, Mr. D. A. Lochrie, Toronto, and Controller Hocken—on behalf of the city, to which Messrs. McCredie and Bechtel made appropriate replies. Various routine business was then transacted, this being followed by an interesting address on the History and Nature of Clay, by Professor A. P. Coleman, of the University of Toronto. The various clays of the province were discussed from the standard of the brick-maker. Professor Coleman stated that in one respect Toronto was certainly unique. The stratified clay found between the upper and lower layers of boulder rock in the Don Valley had not been found in any other part of the world.

On Wednesday evening, at the invitation of the Berg Machinery Company, over one hundred members and their friends attended a performance at Shea's Theatre.

On Thursday, February 15, an address on The Power Plant was given by Mr. Gordon C. Keith. This was followed by a short talk from Mr. H. L. Peiler, of Messrs. H. L. Peiler & Company, Montreal. In the ensuing discussion a number of questions were responded to by Mr. Wickens, who showed a large and varied experience with fuel and the respective merits of coal, wood and gas as heat producers. Mr. Keith drew the attention of the members to the great waste of fuel and pointed out several methods of avoiding this. One large firm, he said, had their fuel examined at the School of Mining before they used it, and in this way were able to determine the heat value and paid for it on the basis of what the examination showed.

At the afternoon session an interesting paper entitled, "Drying: Natural and Artificial," was given by Mr. C. A. Millar, of the Standard Brick Company, Toronto. This was followed by some remarks by Mr. Geo. Frid, of Messrs. Geo. Frid & Sons, Hamilton, Ont. Later a valuable paper on Organization was given by Mr. J. S. McCannell, of the Milton Pressed Brick Company, Milton, Ont.

The annual banquet of the Association was held on Thursday evening at the St. Charles Restaurant.

At the concluding session on Friday, February 16, Mr. Geo. B. Drennan, of the J. D. Fate Company, Plymouth, Ohio, gave some valuable pointers on selling bethods. Mr. A. L. McCredie (the son of Ex-President McCredie) managing editor of the Farmers' Magazine, also dealt at some length with the subject of publicity. Both of these speakers urged that those interested in clay products, and particularly the manufacturers of clay tile, should organize a regular publicity campaign and so emulate the example of those who were behind the cement product and who were exploiting it with considerable success. Mr. McCredie said that the great difficulty in handling cement tile in farm drainage work was the necessity for skilled handling. This difficulty was entirely eliminated in the case of clay tile and there was the added advantage of its comparative indestructibility. The manufacturers knew this but the farmers did not. So it was with other branches of the business.

Just before the election of officers Mr. Anton Berg, of the Berg Machinery Company, Limited, made an eminently valuable suggestion which was finally adopted by the Association in this form, namely, that the newly appointed Executive Committee appoint Special Committees on Technical Education, Ways and Means, Publicity, and Entertainment, each to consist of five members, and to submit its reports in regular order at the next meeting.

Mr. W. H. Freeborn, of Brantford, was elected president; Mr. Chas. A. Millar, of the Standard Brick Company, Toronto, 1st Vice-President; Mr. J. W. Ball, of Russell, Ont., 2nd Vice-President, and Mr. Walter Clark, of Sarnia, Ont., 3rd Vice-President. Messrs. Joseph Russell, D. A. Lochrie, A. Bechtel, Sr., David Martin and Geo. Frid were elected to the Executive.

It was decided to hold the next annual meeting in Toronto. An automobile drive to various places of interest on Friday afternoon brought the convention to a close. The plants visited included those of The Berg Machinery Company, The Don Valley Brick Works, and Mr. Joseph Russell.

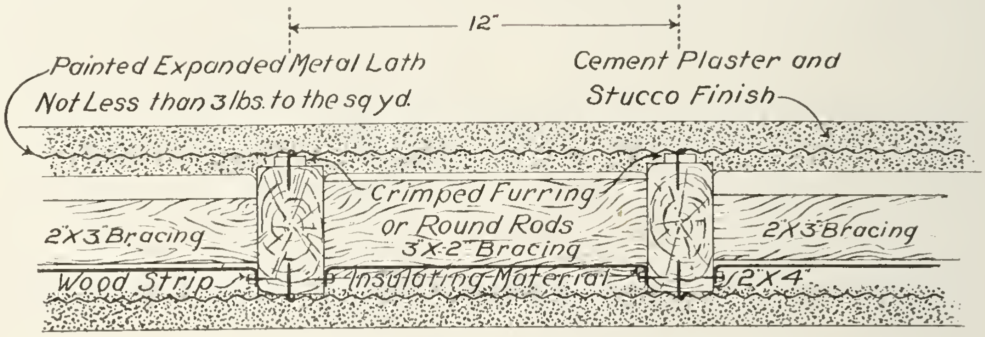
Unusual power plant arrangements have been necessary in the 4300-kw. steam-turbine station of the Northern Heating & Electric Co., at St. Paul, Minn. It is built against the face of a bluff, with its basement below the level of a railroad spur on which coal is received and its sixth storey, containing the company's office, on the level of the street at the top of the bluff. Above the coal-receiving apparatus are the boilers, the third and fourth floors contain the turbines, the fourth also contains the switchboard, the fifth a machine shop, the sixth the general offices, the seventh the engineering offices, and the eighth a store-room.

Metal Lath and Cement Plaster

Typical specifications for stucco on metal lath have been prepared by the Associated Metal Lath Manufacturers, Youngstown, Ohio. These specifications have been framed after investigations extending over a period of more than six months. From the copy furnished the Contract Record by Mr. H. B. McMaster, Publicity Commissioner for the above Association, we extract the following:—

Framing and General Construction

Flimsy construction in framing is false economy. The best will prove cheapest. The studs spaced at 12 inches between centres wherever possible, should be run entirely from foundation to the rafters without any intervening horizontal grain in the wood. These studs shall be tied together just below the second storey joists by a 6-inch board which shall be let into the joists on their inner side, so as to be flush and securely nailed to them. This board will also act as a sill for the second storey joists, which in addition will be securely spiked to the sides of the studs. At two points between the foundation and the eaves, brace between the studding with 2-in. x 3-in. bridging placed horizontally but with the faces of the bridging inclined in alternate directions in adjacent spaces.


12"
Painted Expanded Metal Lath Not Less than 3 lbs. to the sq yd.
Cement Plaster and Stucco Finish
Crimped Furring or Round Rods
3"X2" Bracing
2"X3" Bracing
2"X3" Bracing
Wood Strip
Insulating Material
1/2"X4"

Detail showing section of exterior wall.

All roof gutters should be fixed and down-spouts put up before the plastering is done; the down-spouts should be temporarily placed about a foot from the wall so there will be no break in the plastering where they are to be finally fixed.

Wood copings or rails for tops of parapets, balustrades, etc., are not so good as cement, for they may curl up, warp, check, crack, and in various ways fail to do what they should, viz., **keep water from getting behind the plaster.** This also applies to brick chimneys which when plastered should have wide and tight caps of concrete or stone to prevent water running behind the plaster.

If only wood sills are used, they should project well from the face of the plaster and should have a good drip; either by being placed with a downward slant or by a groove rebated in the under side of the sill near enough to its edge that it will not be covered by plaster. **The drip is an essential of good stucco construction that can not be slighted. It must be used to prevent water getting behind the plaster.**

Lath and plaster should not be carried all the way down to the ground; this same restriction applies to brick or stone.

Care should be taken that all trim be placed the proper distance from the studding or furring to show its right projection after the plaster is on. It is a common mistake to allow too little for the lath and plaster, with the result that mouldings which should project from the face of the wall are back from it or partly buried under the plaster, thus missing the effect desired. About one and a half inches should be allowed for the lath and plaster, making sure that the projection of the moulding to show when finished is not measured in as part of this thickness.

Furring

Use painted or galvanized steel rods or painted or galvanized crimped furring. One-quarter inch is best and it should not be over one-half inch at the most. This furring is to be applied along the face of the studding with galvanized staples.

Insulations

After the lath on the outside has been back-plastered the air space may be divided by applying heavy building paper, quilting, felt or some suitable insulating material between the studs, fastening it by nailing wood strips over folded ends of the material. This insulation should be so fastened as to clear the 2-inch bridging, leaving the preponderance of the air-space on the outside. Care must be taken to keep the insulating material clear of the outside plaster and to make tight joints against the wood framing at the top and bottom of the spaces and against the bridging where the 3-inch face intercepts.

Corner Bead

If corner bead is not used, there should be 6-inch strips of metal lath bent around the corners and stapled over the lathing unless the sheets of metal lath as applied are folded around the corners.

Even though corner bead is used, it is a good precaution to bind the corners in this way and apply the corner bead over the strips of lath.

Lathing

The lath shall be painted to protect it until it can be applied and covered with Portland cement plaster. Care should be taken not to expose the lath to the weather while it is lying about the building.

Use metal lath weighing not less than 3 lbs. per square yard spaced at 12-inch centers and fastened horizontally over the furring strips with galvanized staples 1¼ x No. 14 gauge. The sheets between furring are to be tied with No. 18 gauge galvanized wire.

Plastering

Portland cement will protect metal from corrosion absolutely by reason of its moisture-resisting qualities. Calcined gypsum should not be used in combination with Portland cement; the gypsum will destroy the protective quality in the cement and neither should it be used as a substitute for Portland cement. A gypsum plaster may repel moisture for a time, but Portland cement actually thrives on it.

It is not theory only that Portland cement will preserve iron or steel indefinitely; it has been well demonstrated that Portland cement stucco will endure in any habitable climate. The first and second coats should be of good thickness and the finishing coat should have with it a mixture of waterproofing. A total thickness of plaster of about 1½-inch is good practice.

It is aimed for the first and second coats to get a Portland cement mortar with as little lime in it as will make it work properly. Clean long winter cattle hair should be used.

For the first and second coats and back-plastering, mix in the following proportions:

Lime Mortar—2 barrels of hydrated lime; 1 yard of clean sharp sand free from loam; 4 bushels cattle hair.

Make up at least three days before using.

Cement Mortar—2 parts of clean sharp sand free from loam; 1 part Portland cement.

Mix fresh in small batches as used.

The lime mortar and cement mortar should be mixed and tempered separately, measured carefully, equal parts of each and mixed well together.

In plastering over the face of the stud, the plaster should be forced well through the lath in order to fill entirely the space between the lath and the stud.

The back-plastering should be a heavy coat well troweled so that the lath is entirely enveloped. The finish coat may be done in a way to get any one of the many surfaces which give stucco its charm; this coat should contain no limes as it makes the wall more porous and if a lighter color is wanted than can be gotten with ordinary cement, a white Portland cement should be used.

The waterproofing acceptable to the architect should be mixed with the last coat of the exterior according to directions given by the waterproofing manufacturer. The lathing and plastering on the inner side of the wall need not differ from ordinary practice.

The exterior plaster must not be allowed to set rapidly, if necessary, hang a curtain in front of the wall of burlap or other material that can be kept moist for a couple of days. Stucco should never be applied when the temperature is below freezing.

Stucco on Brick

In applying stucco over brick chimneys a ¼-inch painted or galvanized steel furring strip not lighter than 22 gauge should be fastened to the brick at 12-inch centers with galvanized staples 2-in. by No. 9 gauge driven into the mortar joints. The lath is fastened to the furring with No. 18 gauge galvanized wire, run through under the furring and the same material used for lacing the ends of the sheets together between furring strips.

The same mixture for plaster is recommended for this work as on the metal lath on studding. Before plastering, the brick should be well wetted to prevent its absorbing the moisture from the plaster and the first coat should be forced through thoroughly so that the entire space back of the lath is filled with the Portland cement plaster and the lath enveloped.

Burrard Inlet Tunnel and Bridge Company

Office of the Contract Record,
Vancouver, February 12, 1912.

The above company was formed for the purpose of securing uninterrupted communication between the north and south shores of Burrard Inlet, Vancouver Harbor, by means of a bridge across the Second Narrows, and a tunnel under the First Narrows, with a railway connecting them, and along the north shore of Burrard Inlet from Deep Cove, on the North Arm, to Horse Shoe Bay, on Howe Sound, and from a point near Eburne, on the Fraser River, to the south end of the Second Narrows Bridge.

A charter was granted for this purpose by the Dominion Government on May 6th, 1910, the promoters being Messrs. Lambert Bond, J. P. Fell, J. C. Keith, Ed. Mahon, E. W. MacLean and Jno. Y. McNaught, who are acting as provisional directors for and on behalf of the municipalities interested, viz: the city of Vancouver, the city of North Vancouver, the District of North Vancouver, and the District of Burnaby, who were all subscribers to the petition presented to parliament asking for incorporation. Each of the promoters subscribed for twenty shares of stock, and the municipalities above-named subscribed as follows: the District of North Vancouver, $250,000; the city of Vancouver, $200,000; the city of North Vancouver, $100,000; and the District of Burnaby is taking $50,000, making a total of $600,000, of which the several municipalities interested have taken up their stock and paid ten per cent. thereon, with the exception of the District of Burnaby, which recently passed a by-law in order to take stock in the company.

The Provincial Government has promised aid to the amount of $250,000, and the Dominion Government has promised a grant of $200,000 transferred from the Vancouver, Westminster & Yukon Railway Company to the Burrard Inlet Tunnel & Bridge Company under agreement which was sanctioned by the municipalities interested.

Before incorporation the promoters had a firm of engineers give them an estimate on a double track bridge with roadway which they estimated would cost about $1,500,000. This was before any soundings or borings were taken for piers, etc. Since then the company has appointed the firm of Sir John Wolfe-Barry & Partners, of London, England, as their chief consulting engineers, with whom are associated Messrs. Cleveland & Cameron, of this city. Mr. E. Cruttwell (one of the members of Sir John Wolfe-Barry & Partners) has made a thorough examination of the site, taken borings, and made an inspection of the bed of the Narrows at the bridge crossing at an expense of about $11,000. Mr. Cruttwell prepared sketches showing capacity and cost of different bridges. These were submitted to the board of directors, including the representatives of the different municipalities, and the plan chosen was that of a three-track bridge with two roadways and sidewalk for pedestrians—one track being for steam railway, two tracks for tram-cars, two roadways for vehicle traffic, and an eight-foot walk for pedestrians.

There will be an opening span, 200 feet wide, for ocean vessels, and the bridge will be high enough to allow small craft, such as tug boats and coasting pleasure steamers, to pass underneath without opening the draw. The estimated cost of the bridge is $2,125,000. This is $750,000 more than the first estimate obtained, but this bridge has a much larger capacity. The directors thought it much better to put up a bridge that would have sufficient accommodation for traffic for the next ten or fifteen years.

At a recent meeting the directors of the company had with the Hon. Richard McBride, Premier of British Columbia, regarding further assistance for the larger plan of bridge, he complimented the board on their foresight in preparing for a large increase of traffic by adopting a plan of bridge which had a capacity to supply the public needs for many years. He was very favorably impressed with the proposals and said that he would certainly give them his serious attention as the project deserved the greatest consideration from the Provincial Government. He also mentioned that the bridge across the Fraser River at New Westminster would in a short time have to be supplemented with more accommodation, as traffic was increasing so rapidly, although it is only a few years since it was built.

The company's engineers are now busy preparing plans and specifications of the bridge which will be ready shortly, when tenders will be invited for its construction.

The company stands unique in Canada as being the only railway company working under a special charter from the

Dominion Government, and being owned and controlled by four municipalities through which it passes, the provisional directors mentioned being merely promoters for the municipalities interested. The only personal interest that the directors have in the company consists in owning twenty shares of stock, which is the necessary legal qualification for being a director.

It is expected that the bridge will be completed in two years from now, when it will be open to the use of every railway that comes to the Burrard Peninsula. It will accommodate twelve trains an hour, or two hundred and forty trains a day of twenty-four hours, and from the fact of its being owned and controlled by the public under the jurisdiction of the Railway Commissioners, equal treatment will be guaranteed to all railways desirous of using it.

The Vancouver branch of the Canadian Society of Civil Engineers now has a membership of over 100. At the annual meeting, held on February 5th, Mr. C. E. Cartwright was elected chairman, and Messrs. W. Alan Kennedy, L. G. Robinson and H. P. Archibald, directors. Permanent quarters will be secured for reading room and meeting purposes. A resolution was adopted urging the Dominion Government to appoint a civil engineer from the Pacific coast as an additional delegate to the Twelfth International Congress of Navigation, to be held in Philadelphia this year.

Mr. F. D. Swan, the eminent English engineer who was commissioned by the Dominion Government to prepare a plan of harbor improvements, including a complete pier system, for Greater Vancouver, made good progress with his task while in Vancouver. The work was practically all of a preliminary character; the actual designing of the comprehensive plan will not be undertaken until the engineer has had an opportunity of inspecting the latest harbor improvements in the various ports on the other side of the Atlantic. Mr. Swan expects to return to Canada in March, when his report will be ready for presentation to the Federal authorities.

C. N. R. will Extend Docks at Vancouver

The original plans of the Great Northern Railway Company's dock at False Creek, Vancouver, have been revised lately for the purpose of enlarging the proposed dock and for a larger expenditure of money. As first planned, the dock was to have been 1,000 feet long, measured from the C.P.R. tracks. The revised plan will add 200 feet to this and will include concrete instead of wooden piling. The principal reasons for these changes were that the bottom of the inlet at the site of the dock is of rock formation, and will not allow of piles being readily driven into it, and it is now thought that by extending the dock 200 feet to deeper water a great deal shipping can be accommodated with no great expenditure, such as the cleaning away of the rock would necessitate. An approach approximately 200 feet long, which is being built now, is composed of a series of bents arranged on rock sills, so that pile-driving is not necessary. When this is completed, materials for the rest of the work can be taken out to the site of the large dock. The concrete piling will give the dock a permanency that could not be obtained in any other way. The piers can be fastened directly to the heavy rock of the bottom and insure perfect stability. The upper portion of the wharf is to be constructed in accordance with the lower part, and will therefore be much more of an improvement tran first contemplated.

The Associated Portland Cement Company, of London, England, is establishing a cement factory on Saanich Inlet, Vancouver Island. The site of the works has been named Bamberton, after Mr. H. K. G. Bamber, the managing director of the company, controlling their interests in Canada. The contract for all construction work has been let to The McAlpine Robertson Construction Company, of Vancouver, B. C. The work to be carried out comprises the construction of a reinforced concrete pile wharf with reclamation of foreshore, clearing and excavations on site of works, erection of factory buildings and stack chimney in reinforced concrete, and the provision of housing accommodation for the future employees. Construction work was started on January 1st, and it is the intention of the company to produce cement before the end of the year. The estimated value of the works is about $1,000,000.

One of the most vexatious problems that ever confronted any municipality in the Dominion of Canada—the question of an adequate supply of pure water—was eliminated from the field of controversy recently in the City Hall, Victoria, B.C., when Mayor Beckwith affixed his signature to the contract with the Westholme Lumber Company, which calls for the execution of all the necessary work in connection with the tapping of the waters of Sooke Lake and conveying the same to the city of Victoria.

The Building Outlook at Winnipeg

A season of exceptional building activity is assured at Winnipeg. The announcement of the Canadian Pacific of their intention to further facilitate the handling of their heavy freight traffic east and west is regarded as an indication of the decision of the company to locate their new shops in the vicinity of Transcona, and not at Selkirk as reported. In the event of this proving to be the case, it is understood that the Canadian Pacific will erect shops and buildings, which in capacity will not fall far short of those of the Transcontinental railway.

Another theatre will be built in Transcona, if plans under consideration are carried into effect. A company has been incorporated to undertake the enterprise, and a site secured on Regent street. The new theatre will be known as the Coliseum, and will have a seating capacity of 500.

There is little reason to fear the effect of the existing unsatisfactory business conditions on the Winnipeg building trade. The retail lumbermen of the west may be seriously handicapped by the tie-up of a portion of last year's crop, but the effect of this will hardly be felt by Winnipeg contractors. With the exception of half a dozen firms, few city contractors tender on work outside, unless it be for one or other of the railway companies.

Although it is a little early to predict anything very definite in the matter of building prospects, there are indications of a busy twelve months to come. While no official announcement has yet been made by the city building inspector, it is known that the value of building permits issued during the past month have far exceeded the total for the month of January last year. In view of the fact that this total is made up of an aggregation of small permits for dwellings and the like its significance is not to be overlooked.

Winnipeg architects are unanimous in declaring that 1912 will be a banner year in building. Preparations are under way for a number of apartment blocks and substantial residences, and also for warehouse and office buildings. An interesting feature of the coming building activity will be the enlargement of a number of the hotels, for which plans have already been prepared. There have passed through the draughting room of one firm of architects alone during the past month plans for two new hotels, a large public automobile garage, and several residences of the better class.

Hon. Dr. Reaume, Minister of Public Works, has given his approval to a change in the country roads system of Peel county, that will open the way for a high-grade road from Toronto to Hamilton. The government will contribute one-third of the cost.

G. T. P. Progress in the West

Good progress is being made by the Grand Trunk Pacific on track laying on the Western lines. On the main line the track is now 1,075 miles west of Winnipeg, beyond Yellowhead Pass, on the western slope of the Rocky Mountains. On the Alberta coal branch, which is being built from Bickerdike into the Brazeau coal fields, the track has been pushed 21.4 miles south of the former place. On the Tofield-Calgary branch steel has been laid 105.3 miles south of Tofield, and on the Young-Prince Albert branch it has been laid 67.3 miles north of Young. The entire branch between Melville and Regina has been completed, a mileage of 98.4 as has also the 52 miles between Melville and Canora. On the Regina-Moose Jaw branch the end of steel is now 1.1 miles west of Regina. Upwards of 500 miles of grading on branch lines is now completed awaiting the delivery of steel for track-laying to be resumed. On the mountain division it is now at the mouth of the tunnel, 104 miles east of Prince Rupert. Armies of men and teams making up the construction forces are now engaged in transporting supplies along the Fraser River between Tete Jaune Cache and Fort George in British Columbia, and this entire section of the line, covering 180 miles, will be a busy scene of action until "east and west meet" on the new Transcontinental.

Extensive Railroad Plans for Alberta

The Provincial Government of Alberta is planning to guarantee bonds for over 1,600 miles of railroad for that province. Resolutions are now before the legislature calling for a guarantee of the bonds of the railway companies in respect to construction in the province of Alberta under charters now held by the Canadian Northern Western, the Canadian Northern, Edmonton, Dunvegan & British Columbia, and Grand Trunk Pacific Branch lines companies.

The lines will be guaranteed at the rate of from $13,000 to $20,000 a mile, the bonds bearing interest at 4 per cent. and extending for 30 years. Of this construction, 1,405 miles will be built by Canadian Northern lines holding charters from provincial or Dominion governments, 350 represents the Edmonton, Dunvegan & British Columbia line construction as far as Dunvegan, near the boundary of the province northwest of Edmonton, while the Grand Trunk Pacific coal mines branch, 58 miles in length, running from Bickerdike southwesterly, is also to be constructed under a provincial guarantee.

Of the Canadian Northern lines, 150 miles had been guaranteed by the province under Dominion charter. This guarantee will be repeated under the provincial charter. The total new construction provided for will thus be 1,255 miles of Canadian Northern line, and in all 1,663 miles. The guaranteed lines of railways will cover the province with a network extending from Fort McMurray, in the northeast, and Peace River Landing, in the northwest, to Pincher Creek, in the southwest, and the international boundary, south of Medicine Hat. On the Onoway branch of the Canadian Northern construction is to be guaranteed through to the British Columbia boundary, through the Grande Prairie country, while the new Pakan line through St. Paul de Metis, will be constructed to the eastern boundary of Alberta under the terms of the guarantee. Following are the lines of the Canadian Northern Western Railway for which a guarantee of securities is proposed: Onoway line, 250 miles, $20,000 a mile; from Athabasca Landing to Peace River Landing, north of Lesser Slave Lake, 100 miles, $15,000; from Athabasca Landing to Fort McMurray, 175 miles, $15,000 a mile; Lac la Biche branch from the above lines, 40 miles, $15,000 a mile; line north of Saskatchewan, through Pakan, passing by way of St. Paul de Metis to the eastern boundary of the province, 100 miles, $13,000 a mile; line from a point on the C. N. R., near Bruderheim, passing through Bruderheim and Vermilion, south to Medicine Hat and the southern boundary of the province, 200 miles, $13,000 a mile; line west of the Calgary and Edmonton Ry. from Strathcona, west of Pigeon Lake to Pincher Creek, 100 miles, $15,000 a mile; from Camrose southeast, 80 miles; Calgary to a junction with the Brazeau line east of the Calgary and Edmonton Ry., 100 miles, $13,000 a mile; extension of the Brazeau line from the Calgary and Edmonton southwest to connect with the Goose Lake extension of the C. N. R., 130 miles, $13,000 a mile.

The province will guarantee bonds of the C. N. R. for the extension of the Goose Lake line from the eastern boundary of the province to a junction with the Vegreville-Calgary line north of the crossing of the Red Deer River, at $1,300 a mile. The construction of this line was first undertaken under a Dominion charter.

The Grand Trunk Pacific branch line from Bickerdike 58 miles, to a point on the Little Pembina River, will be guaranteed at the rate of $2,000 a mile. The Edmonton, Dunvegan & British Columbia road from Edmonton to Dunvegan, 350 miles, will be guaranteed at the rate of $20,000 a mile. It is understood that the company contracts to commence construction immediately upon opening of spring and to complete at least 100 miles in 1912.

Surveyors are at work preparing the route for the Calgary Street Railway's extension to the site of the Canadian Pacific Railway Company's shops, east of the Bow River, and work will be started shortly. It is the desire of the city authorities and of the Canadian Pacific Railway that this work should be completed and the line in operation just as soon as the work on the new shops is under full swing.

Messrs. M. P. and J. T. Davis have begun operations on the Nova Scotia Railway, extending from Yarmouth, on the opposite side of the harbor from Halifax, to a place called Doan's Settlement, a distance eastward about seventy miles. This road will be eventually extended to Country Harbor and the Strait of Canso. Messrs. Davis have two years to complete the first section, but they intend to have a large gang of men at work during the summer.

A sub-contract for 185 miles of the Hudson Bay Railway, commencing at Le Pas and extending eastward to a point west of Split Lake, has been secured by Messrs. McMillan Bros. from Mr. J. D. McArthur, both Winnipeg contractors. McMillan Bros. have built 300 miles of the Grand Trunk Pacific, starting at Portage la Prairie to the Touchwood Hills. The country traversed by this contract is through muskeg and very little rock will be encountered. The manner of putting up the grade will be very similar to the operations on the G. T. P. west of Edmonton, in which wheelbarrows are used extensively.

Work on the G. T. R. bridge across the Richelieu River at Lacolle Junction, P.Q., is to be rushed in order to complete it by the opening of the river navigation. The structure is being built by the J. S. Metcalf Company, Limited, Montreal, and consists of a new pivot pier with protection cribs, two rest piers, and also piers for approaches. The contract for the superstructure has been awarded to the Dominion Bridge Company, Lachine, and the drawings are nearly completed. Some of the material has been manufactured, the bridge consisting of a 250-foot swing structure and twelve 60-foot deck spans. The bridge will be 30 feet high and 18 feet wide, single track. The swing bridge will contain 275 tons of metal and the balance of the structure 330 tons

Mainly Personal

Mr. J. A. Masse has been appointed General Superintendent of Mechanical Works of the Port of Montreal.

Mr. R. S. Lea has been selected by the Citizens' Association as a condidate for the position on the Montreal Board of Control. He is a consulting engineer and a member of the Canadian Society of Civil Engineers.

Mr. W. B. Russell, the contractor for the celebrated "canal" at Newmarket, Ont., has received from the Department of Railways the sum of $1,000 as compensation for the cancellation of his contract.

The first of a series of lectures on Reinforced Concrete was given on Tuesday, February 13, at McGill University, Montreal, by Professor Brown. The attendance numbered about sixty.

The Superintendent of Building Construction for the C.P.R.

Mr. F. L. Ellingwood, of Montreal, Superintendent of Building Construction for the C.P.R., was born in Eastport, Me., in 1863. His parents were direct descendants of the earlier English and Scotch settlers in the then British Colonies. His boyhood and youth were spent in Southern Wisconsin, where he received a common and high school education. In the early 80's he was employed in the engineering department of the Burlington, Cedar Rapids and Northern Railway on construction, and later in its bridge and building department. Subsequently he took up the study of architecture in New York, and went into practice in that city in 1890, continuing until 1905, in the latter part of which year he took a position with the architects for the new Pennsylvania Railway Station in New York, and had charge of the compilation and getting out of drawings for that building. Later Mr. Ellingwood had a similar charge of the work for the new post office building in New York City. In November, 1910, he went to Montreal with the C.P.R. During the time he was in practice in New York he was concerned, either individually or in partnership, with the erection of many important buildings, including the large residence of Sir William Mackenzie in Toronto, and that for Mr. C. Oliver Iselin, near New York. Later he was identified with such buildings as the St. Luke's Hospital and St. Nicholas Rink buildings in New York, the Corcoran Gallery of Art in Washington, D.C., and large apartment houses, hotel buildings, etc.

Mr. F. L. Ellingwood, Montreal

In May, 1911, Mr. Ellingwood was appointed to his present position. He has general charge, under the supervision of the vice-president, of such of the larger station buildings, hotels and other work as may be designated by the president from time to time, or vice-president. He appoints local superintendents, foremen and inspectors to insure proper workmanship on the part of contractors and others, and all drawings and specifications for work under his charge are issued through his office.

Alderman Hepburn, of Vancouver, Contractor

Mr. Walter Hepburn—more familiarly known in his own city as Alderman Hepburn—is one of the leading contractors of Vancouver, and is well known in the industry throughout the whole of British Columbia. Born some 54 years ago at Robinson, P.Q., he was educated in eastern Canada and served his apprenticeship there as a carpenter and joiner. He located at Vancouver about 18 years ago and has resided there ever since. Prior to this he spent some ten years in Ontario, and two and a half years in Manitoba. During the period that he has been in Vancouver he has carried out a great deal of work. Some of the larger structures erected by him are the Felix departmental building, which cost $140,000; the Granville Palace building, which cost $135,000; the Hotel Barron, and the Crown building. Mr. Hepburn has had a wide and varied experience in contracting work, extending over more than a quarter of a century. In public life at Vancouver he is held in high esteem. He was elected alderman in 1907, 1908, 1910 and again this year. He is a governor of the Vancouver General Hospital, and incidentally chairman of its Building Committee which is entrusted with the expenditure of $800,000. He was president of the Builders' Exchange for two terms—1903 and 1904.

Alderman Hepburn, Vancouver

Mr. Geo. Rettig, landscape architect, Cleveland, Ohio, gave an address on City Planning before the Canadian Club of Toronto, last week. Mr. Rettig described the system of Cleveland and mentioned the grouping of public buildings, encircling boulevards and diagonal avenues as essential parts of the planning of a city. He also laid stress upon the value of breaking the length of a main street by a slight angle rather than having it perfectly straight. The principle, he said had been adopted in a number of European cities.

A visitor to Victoria last week was Mr. H. S. Tangye, vice-president of Messrs. Tangye Limited, Birmingham, Eng., one of the largest engineering concerns in the United Kingdom. The object of Mr. Tangye's visit was to appoint representatives in the leading cities of the Dominion.

Mr. Herbert P. Thomas has been appointed superintendent of the city electric light department of Nelson. Mr. Thomas is a native of Australia and a graduate of the University of Melbourne. Coming to Canada with the idea of completing his engineering education, he took his B.Sc. degree from McGill and then entered the service of the Allis-Chalmers-Bullock Company as erecting engineer, for two years. Kenora (Ont.) then offered him the position of manager of public utilities, which important position he retained for three years, resigning to go to Nelson.

Col. R. H. Thompson, chief engineer of the Seattle port commission and ex-city engineer of Seattle, has been invited to act as consulting engineer in connection with the repairs to the Smith's Hill Reservoir at Victoria, B.C.

Mr. W. A. Stanley, assistant secretary of the Montreal Builders' Exchange, has resigned to become manager of the Windsor Strip Company, Montreal.

Mr. Percival W. St. George, whose name was mentioned in connection with the vacancy on the Montreal Board of Control, created by the retirement of Mr. Wanklyn, has declined to consider a nomination unless the term of office be extended to four years. At present it is only two years. He also stipulates that he be permitted to continue his private practice as a consulting engineer.

Obituary

News has been received in Montreal of the death at Ashville, N.C., of Mr. Richard Boronow, a partner in the Engineering Equipment and Supply Company. Mr. Boronow, who had lived in Montreal for twenty years, was fifty-four years of age.

Mr. Richard R. Mitchell, president of the Robert Mitchell Company, Montreal, died on February 8 at his residence, Westmount, after an illness of six weeks. Mr. Mitchell was born in Montreal 48 years ago. In 1897 he became head of the establishment founded by his father, the late Robert Mitchell, in 1851. Mr. Mitchell is survived by his wife and two sons, Messrs. Leslie S. and Allan M. Mitchell.

Construction News and Notes

Last year the town of St. Lambert, P.Q., spent $229,293 on permanent improvements.

At a meeting in the Montreal City Hall, a committee was appointed to study the question of better housing.

The building permits issued at Vancouver last month totalled $700,377, compared with $1,412,442 for January, 1911.

The capital stock of the Sudbury Brick Co., Ltd., has been increased from $20,000 to $50,000 by the issue of 300 shares of new stock at $100 each.

Sir William Mackenzie, president of the Canadian Northern Railway, when in Montreal recently, stated that the company's line from Montreal to Toronto, via Ottawa, would undoubtedly be completed by the end of the present year. The contract for the section of 39 miles between Ottawa and Pembroke has been let to J. P. Mullarky, who has already received contracts for several other sections.

The Canadian Northern Railway has applied to the legislature for a charter to extend its Swift Current line north to a point at or near Battleford.

The annual meeting of the Canada Cement Company has been fixed for March 7 next, when it is stated that a good report on the business of the concern will be presented.

According to a dispatch from London, Eng., Calgary's last issue of municipal bonds was over-subscribed. This is the first time that such an occurrence has taken place for some months past.

For the month of January the Montreal building permits totalled 69, of the value of $272,490, divided into 48 permits, worth $258,450, for new work, and 21 permits, of the value of $14,040, for alterations.

Chief Engineer Janin, of Montreal, has been instructed to prepare plans and estimates for six public lavatories at a cost of $100,000. The Board of Control has been studying information on the subject from New York, Boston, Toronto and Manchester.

The Builders' Exchange of Calgary has issued a pamphlet containing a reprint of the city building ordinances and giving a list of the members of the exchange. These pamphlets may be had upon application to the secretary of the exchange, Mr. W. A. Chamberlin.

On Wednesday, February 14, the legislation committee of the Quebec Legislature passed the Metropolitan Parks Commission Bill, with slight amendments. The commissioners will have power to impose a tax on all taxable property for the purpose of acquiring sites for parks, boulevards, etc.

In an address before the Empire Club at Toronto last week Mr. A. W. Wright characterized the proposed Georgian canal as a "stupendous national folly." Mr. Wright urges an enlargement of the Welland and St. Lawrence systems as the only proper solution of the Canadian waterway problem.

An announcement was made in the Ontario Legislature last week by Hon. Dr. Reaume, Minister of Public Works, that the Provincial Government would ask the Legislature to approve of a further appropriation of one million dollars to assist in the construction of county roads throughout the province.

Russell Shale Bricks, Limited, have commenced operations at Russell, Ont., near Ottawa, with 100 men. Among those identified with the new company are Messrs. Trenholme and Galibert, of Montreal. The president is Mr. G. F. Hodgins, of Shawville, Que., and the vice-president Mr. A. W. Fraser, K.C., of Ottawa.

The Railway Committee of the Quebec Legislature has passed the Bill incorporating the Ottawa, Abitibi & Hudson Bay Railway Company. The name of the company has been changed to that of the Montreal, Manawaki, Abitibi & Hudson Bay Railway Company. Work must be started within three years and completed within ten years.

The Board of Education at Toronto have endorsed the recommendations of the Property Committee for the expenditure of $670,000 upon the enlargement of public school buildings this year. The recommendation of the Advisory Industrial Committee that the sum of $800,000 be included in the estimates for the new Technical School building was also passed.

The contract for the extensive harbor works at Courtenay Bay, St. John, N.B., which was awarded tentatively to Messrs. Norton Griffiths & Co., has been finally ratified. The contract price is $7,500,000 and the work is to be completed in four years. Mr. W. Burton Stewart, who was in Ottawa last week closing up matters with the authorities, stated that operations would be commenced immediately.

Some changes in the original proposal to construct the Mount Royal Hotel, Montreal, have been made. It has now been decided to build one section of the hotel, which will cover one-half of the site, which is at present occupied by a departmental store; the plans, however, provide for an addition, which, when made, will make the hotel one of the finest in Canada. The present store is to be demolished almost at once.

Sir Max Aitken, M.P., is associated with Mr. J. E. Wilder, of Montreal, in a scheme for a boulevard in the east end of the city. Real estate of the value of three and a half million dollars has been purchased on Ontario street east and the idea is to demolish a large amount of property and construct a boulevard after the plan originated by Mr. William Lyall, with a view to relieve the congestion in St. Catherine street. Mr. Wilder suggests that the city should adopt the scheme and carry the boulevard the entire length of the street. Should the plan be left to private enterprise the work will be done in sections, owing to the various times at which the leases fall in.

Good progress has been made on the new General Hospital at Toronto. Generally speaking the work is half finished. The pathological building, erected by Messrs. R. Robertson & Sons, Ltd., is the only building completed and is now being used for University classes. Steel work on the private patients' building (R. Robertson & Sons) will be commenced early in the spring. The exterior work of the emergency building, out-patients' building, nurses' home, power house and servants' building is completed but a great deal of interior work is yet to be done. The estimated cost of this undertaking is $3,500,000. The buildings when completed will cover a site 725 feet long and 620 feet deep.

A strong appeal to the Government for protection of Canadian cut stone was made last week at Ottawa by a deputation headed by Mr. J. H. Lauer, of Montreal, which waited on Hon. W. T. White, and afterwards on Hon. J. D. Reid, and complained that the tariff was loosely drawn in regard to dressed stone, the result being that very large shipments of stone from the United States entered Canada practically free of duty. They drew attention to the fact that this stone was being largely used in the construction of big hotels, notably the Grand Trunk Pacific Railway Hotel at Winnipeg and the Canadian Pacific Railway Hotel at Calgary. The Ministers advised that the builders put their case before the Tariff Commission. It was pointed out that tariff revision on one item would be difficult.

On Monday, February 12, a deputation from Montreal waited on Premier Borden, the Hon. F. D. Monk and the Hon. C. J. Doherty and asked for an assurance that assistance would be given for a tunnel from Longueil under the St. Lawrence and the city, coming out at Jacques Cartier Junction. The deputation was composed as follows: Mr. Duncan McDonald, of the Montreal Tramways Company, ex-Mayor H. A. Ekers, Lieut.-Col. Carson, Mr. Duncan McMartin, Mr. L. H. Timmons, Mr. N. A. Timmons, Mr. J. M. Fortier, Mr. L. J. Morin and Mr. F. E. Meredith, K.C. Messrs. James Forgie and Paul Feurot, representing the engineering firm of Messrs. Jacobs & Davis, of New York, London, Paris and Montreal, also accompanied the deputation. The Premier did not give any definite answer.

The town engineer of Outremont, Mr. Duchastel, has prepared the following report of estimates of the work necessary in 1912, and recommends that a start be made at the earliest possible date. Details are as follows: Concrete sidewalks on whole or portions of thirty streets to the approximate total of 37,120 lineal feet, at an estimated cost of $46,412.50. Sewers on fourteen specified avenues or portions thereof, approximate cost $89,310. Grading and macadamizing on twelve avenues or sections thereof, $46,860. This brings out a total of $182,582, and it is understood that the balance of a proposed bond issue of $400,000 will be devoted chiefly to the building of conduits for the accommodation of electric wires, and other work in connection with the recent decision to have the wires removed from the public streets.

On Wednesday, February 14, at a luncheon of the Montreal Builders' Exchange, Mr. F. G. Todd read a paper on town planning and traffic routes. Mr. James Ballantyne presided. Mr. Todd referred to the moral and social benefits of town planning, but he pointed out that they must not overlook the great economic advantages. One might talk for ever to the average ratepayer as to the moral advantages, but it would be in vain until the economic results were shown. Mr. Todd then outlined a scheme for improving Montreal's traffic routes, and remarked that certain streets were now congested, and unless something was done they could imagine the condition in a few years. No doubt he was looking a long way into the future, but it was good business to do so; it was to the builders that they must look for constructing a greater and better Montreal. Mr. Todd also spoke in favor of the Metropolitan Parks Bill, which would prove of the greatest benefit to the city.

An inspection of the concrete work at the slow sand filtration plant, recently completed for the city of Toronto, was made last week by two experts appointed for the purpose, Mr. W. F. Tye, Toronto, President of the Canadian Society of Civil Engineers, and Dr. Galbraith, of the University of Toronto. Their report in regard to the charges made against the efficiency of the plant is summarized as follows:—"The concrete work on the filtration plant is good throughout. The cracks in the walls and floors were not due to faulty construction, but to causes which were hard to foresee. There has been no settlement of the floors or walls of the filters or the reservoir. It is inadvisable for the city to try to repair the leaks in the filters and the reservoir, as that would entail an actual loss. The various buildings in connection with the plant are suitable for the purposes for which they were designed. The electric motor pumps can probably be brought up to the point of efficiency necessary. A park on top of the reservoir will be absolutely safe, as the reservoir will never settle, no matter how great a load may be placed upon it."

A large expenditure is called for in the estimates of the current year submitted by City Engineer Rust of Toronto. The appropriation required is $2,565,810, which is divided as follows:—Maintenance charges, salaries, street repairs and cleaning, renewal and repair of plant, last year's overdraft, etc., $539,821; new bridges, including the proposed new concrete bridge at Gerrard street, $325,215; new pavements, sidewalks, curbing, opposite exempt properties, $51,752; special works, $36,250; new sewers, $145,200; additional plant, $7,050; total, $1,105,288, as compared with $447,994.35 expended last year. Water Works branch—General maintenance, pumping, distribution, filtration plant and high pressure service, etc., $392,930, as compared with $321,360.70 expended last year. On construction it is proposed to spend $1,044,299, as compared with $134,575.97 last year. The chief items included in the former amount are:—new meters, $100,000; two 15,000,000-gallon triple expansion engines, including buildings and connection, $350,000; new mains, $281,519; intake repairs and extension, $125,000; extension of high pressure mains, $76,000; new press house equipment, $80,000.

Blowers For Oil Furnaces

The blowers in connection with the oil furnaces at the Transcontinental Railway shops at Transcona, near Winnipeg, Man., were especially designed by the Canadian Buffalo Forge Company, Limited, to give the exact quantity of air required for each group of forges and furnaces.

The fan for the boiler shop consists of No. 12 steel pressure blower, down discharge, connecting to the underground distributing pipe, which is placed 13 inches below the floor level. From the outlet of the blower a large sweep elbow is thus allowed and there is then an increaser piece from 18 inches diameter to 24 inches diameter, the main pipe line being continued 24 inches diameter, reducing in section only as the pipes were taken off. The larger blast pipe not only provides for future extension in case it is found necessary, but also regularly reduces the friction which is inevitably incurred wherever it is attempted to force air through piping at a hige velocity. This blower is designed to deliver 10,000 cubic feet of air per minute, at a pressure of 16 oz. when running at 1,750 r.p.m. and is direct connected with flexible coupling to a 75 h.p. Allis-Chalmers-Bullock motor.

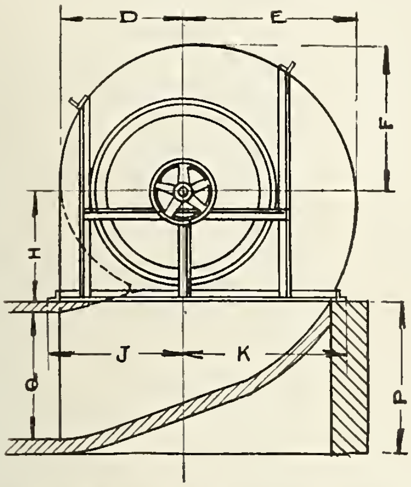
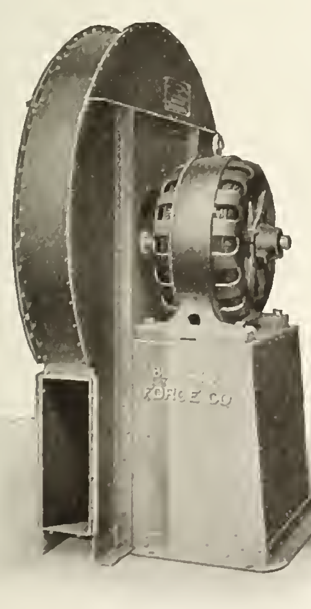


Fig. 1—Blower, of three-quarter housing type.



g. 2—Fan direct connected to motor.

A feature of the whole installation is the fact that for all the large groups the blowers are direct connected to motors, thus eliminating belts and the constant repairs necessary where the alternative method of countershafts and beltings is employed.

The steel plate blowers on this installation are especially interesting—due to the fact that they are the three-quarter housing type, which means that the lower quarter of the fan is below the ground (see Fig. 1). Further, the fans are of the bottom horizontal discharge construction, so that the outlet is below the ground, and is directly in line with the blast pipe, eliminating at least two elbows and giving a free positive flow of air direct from the paddles of the fan blast wheel. These outfits are all direct connected to motors, motor sub-base being attached to the fan, making in every case a compact staple outfit, and eliminating all repairs and lost power due to the use of belts.

A further feature is the construction of blowers of this type for delivery of air at such a high pressure as 14 oz. with a speed so low as 1,700 r.p.m. The standard blower supplying, e.g., 2,700 cubic feet of air per minute at 14 oz. pressure, would need to operate at a speed of approximately 4,000 r.p.m.

The desired results are secured by the use of a special narrow housing, with blast wheel of large diameter, and with a special construction of blast wheel having a larger number of blades than in the ordinary design (Fig. 2).

"Automatic Fire Protection," is the title of a booklet of 28 pages just published by the General Fire Extinguisher Company (executive offices, Providence, R. I.). The booklet describes in detail the installation and operation of a system of Grinnell automatic sprinklers, and gives, in a number of sketches, a very clear idea as to how such a system is applied to any particular building under a great variety of conditions. Cuts showing the details of the sprinkler heads and dry-pipe and alarm valves will be found particularly valuable, as sections are given, so that the entire operation may readily be followed. This little booklet, bound in an attractive cover, may be obtained for the asking from the General Fire Extinguisher Company.

"Concreting in Winter is the title of a seasonable booklet just issued by the Aberthaw Construction Company, 8 Beacon street, Boston, Mass. It embodies some of their experience in cold weather reinforced concrete work, extending over a period of eighteen years. The booklet is well illustrated and besides giving a description of the methods used by the Aberthaw Construction Company, it points out why reinforced concrete should be selected for winter work in preference to other types of construction. To factory owners and all who have anything to do with reinforced concrete it will be found interesting as it shows just what can be done in the winter by experienced concrete contractors. It will be sent free on request to the Aberthaw Construction Company, Boston, Mass.

In the Quebec Legislature recently the Hon. Mr. Taschereau dwelt at some length upon the extent of the good roads programme outlined by the province. The expenditure involved was no less than $10,000,000. Such a sum would enable the province to build 3,300 miles of macadamized road at a cost of $3,000 a mile. This would mean four important highways between Quebec and Montreal, two on the north and two on the South Shore. There would be one from Quebec to the western boundary line via Sherbrooke and Beauce County, from Quebec to Gaspe, Quebec to Tadousac, Montreal and environs, Montreal to Ottawa, Montreal to the United States boundary line and 200 miles in the Lake St. John district. Even when these were completed there would still be funds for 1,200 miles more.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Aylmer, Que.

A septic tank to cost $6,000 is under consideration and a committee representing City of Ottawa has made proposition to town to pay half cost.

Castor, Alta.

Tenders will be received until February 26th for supply of steel water tank to contain 120,000 gals. on tower 75 ft. high. Engineer, L. B. Brown. Address, Town Commissioner, Castor.

Fernie, B.C.

A by-law will be submitted to provide sewers at a cost of $20,000. City Clerk, S. W. Barclay, Fernie.

Hamilton, Ont.

Tenders are called for waterworks extension: supply of 2,200 lin. ft. of 48-in. steel intake pipe with expansion joints, intake and flanged specials, sluice valves, bolts and gaskets. Plans, etc.. with city engineer. Tenders addressed to Geo. H. Lees, Mayor, c/o city clerk, received until 5 p.m. Feb. 28th. City Clerk, S. H. Kent; architect, A. F. Macallum.

London, Ont.

The Waterworks Commission contemplates spending $25,000 on additional mains, and plans will be prepared at once. Chairman, P. Pocock; engineer, H. J. Glaubitz.

Moose Jaw, Sask.

Tenders are called for supplying and erecting one water tank of 75,000 gallons capacity. Specifications at office of Walter J. Francis & Company, consulting engineers, Montreal. Tenders received by City Clerk until noon, Feb. 26th. City Clerk, E. B. Bonnell.

New Westminster, B.C.

The city has placed a contract with Mussens Limited, Montreal, Que., for a 12-ton "Ruston, Proctor" Compound Cylinder Road Roller with three tyne scarifier.

Plans will be prepared for pavement and sidewalk; paving Columbia street from McInnes to 10th avenue; also concrete walks on several streets. Clerk, W. A. Duncan; City Engineer, J. W. B. Blackman. City engineer instructed to prepare plans.

North Toronto, Ont.

Engineer E. A. James has recommended that a 5-ft. sidewalk be laid on both sides of Mt. Pleasant road and Eglinton avenue at a cost of $6,300.

Oshawa, Ont.

Tenders will be called for pavements to cost $75,000. Engineer, Frank Chappell, C.E. Asphalt block pavements are petitioned for, but other classes will be considered, 25,000 sq. yds. complete with curbing.

Stratford, Ont.

Tenders will be called for storm sewer to cost $43,244. City Engineer, Mr. Ferguson. The above amount will be spent in covering the Romeo Creek and making a storm sewer.

Toronto. Ont.

Engineer C. H. Rust, City Hall, has included in the estimates 2 new steam pumps; capacity 15,000,000 gals. Cost $350,000.

Tenders are called for construction of forty miles macadam highway on roads under direction of Board. Specifications at office of the Board, 57 Adelaide street east, Toronto. Engineer, E. A. James.

Winnipeg, Man.

Tenders are called until Feb 23rd for sewers on College avenue, from McGregor to McKenzie streets. Engineer, Ruttan, 223 James street.

Tenders are called for electrical equipment for waterworks. One line panel for control of 12,000 volt line to be made of slate, 90 in. x 24 in.. approx. black marine finish. One set of 12,000 volt, 3 phase, electrolytic lightning arresters with disconnecting switches (manufacturer to give descriptive information regarding this material.) Three 50 kw. self cooling, oil insulated, 60 cycle, single phase transformers, normal ratio, 13,000 volts primary to 2,400 volts secondary, with two additional taps on both primary and secondary sides. The ratio of these taps to be specified by the manufacturer. Received by Board of Control until Feb. 21. 1912. Secretary, Board of Control, M. Peterson.

Tenders are called for 150-6 in. hydrants and gate valves, 50-8-in. hydrants and gate valves, f.o.b. city yards. Received by Board of Control until 11 a. m. Mar. 1st. Sec. Board of Control, M. Peterson.

Tenders are called for supply of 1,000 L. ft. of C.I. water pipe, 4-in.; 15,000 L. ft. of C.I. water pipe, 6 in.; 12,000 L. ft. of C.I. water pipe, 8 in. To conform to Can. Society of Civic Engineers, Class "C." Sec. Board of Control, M. Peterson, Winnipeg. Received by Board of Control until March 1st.

Tenders have been called for extension to sewers on following streets: Eaton, $880; Kylemore, $4,478; Chalmers ave., $2,430; Jasper ave.. $2,464; Herbert ave., $2,950; McPhail street, $697; McPhillips street, $6,318; Wolseley ave., $1,000; Levinia ave., $1,275; Erin street, $5,739; Hugo street, $4,302. Received by Chairman Board of Control Feb. 16. Sec. Board of Control, M. Peterson.

CONTRACTS AWARDED

Neepawa, Man.

Waterworks to cost $100,000. Engineer, Chipman & Power, Toronto and Winnipeg. The following contracts were awarded: Contract A—L. W. Shrubl, N. Dakota, $32,504; water mains and sewer. Contract B—W. P. Shearer, Neepawa, $5,300; pump house, etc. Contract C1—Des Moines Bridge Co., Des Moines, $6,880; stand pipe. Contract C2—W. R. Black, Neepawa; stand pipe. Contract C—Des Moines Bridge Co. Des Moines, $3,000; stand pipe. Contract D—Can. Foundry Co., Toronto, $15,727; cast iron pipe. Contract E—Can. Foundry Co., Toronto, $2.713; gate valve and hydrants. Contract H—Flanigan & Murphy, Ft. William, $4,775; dam.

Pt. Claire, Que.

Water Works, Sewer and Electric Lt. Sec.-Treas., Ralph E. Stockwell, Town Engineer, S. H. Dupont, 62 St. James street, Mtl. Contractors, Laurin & Leitch, Beaver Hall Square, Montreal, $105,000. Pump house, 46 x 22 inside, brick; one 60 h.p. steam boiler, 1 electric and 1 steam driven pump; 2 low pressure pumps, steel pipe, sewer pipe, stand pipe, 22 ft. dia.. 80 ft. high; manholes, 1600 ft. 10 in. intake pipe, poles, braces and guys for electric plant.

Railways, Bridges and Wharves

Brantford, Ont.

Tenders received until Feb. 23 for construction of concrete abutments for bridge over Fairchilds Creek. Clerk, James A. Smith, Brantford.

Calgary, Alta.

Tenders will be called by N. E. Brooks, Div. Engineer Can. Pacific Ry. Co., until Feb. 24th for erection and completion of 16 complete Western Railway stations.

Excavation has commenced on subway to cost $40,000. City Engineer, J. T. Child, Calgary. Tenders received by City Commissioner.

Edmonton, Alta.

Tenders are called for concrete substructure for bridge for Canadian Pacific Railway. Divisional Engineer, N. E. Brooks, Calgary. Overhead bridges and subway. Specifications at Edmonton, Strathcona and Calgary.

Medicine Hat, Alta.

Surveys are being made for eight-mile spur railroad (steam) city to Ainsley coal mine. Builders, Anslep Coal Mining & Manufacturing Company, Medicine Hat. Rails, saddle back engine and freight cars. Contracts likely called in May.

Montreal, Que.

Canadian Pacific Railway are having plans prepared by Divisional Engineer's staff for erection of freight sheds on St. Patrick street.

New Westminster, B.C.

Harvey C. Brice, C.E., supervising engineer Surrey dining district, will take tenders until March 10, addressed to Room 3, Westminster Trust Building, New Westminster, for erection of two concrete dams and excavation of river channel in the Nicomeki and Serpentine Rivers near here.

Ottawa, Ont.

Ottawa Street Railway Company. City Engineer, N. J. Ker is preparing plans which will call for 6½ miles extensions to Ottawa Street Railway. Approximate cost, $250,000.

Debentures will be called for electrical conduits to cost $70,000, Sparks street, for Ottawa Corporation Electric Commission. City Engineer, N. J. Ker. Plans have been prepared. Conduits to be laid on all streets having hydro lights.

Bridge to cost $135,000, over Rideau Canal at Pretoria avenue. City Engineer, N. J. Ker. Reinforced concrete, 5 arches, main arch 680 ft. span, 30-ft. head room above water, bridge 54 ft. in width over all, allowance made for double track railway and 6-ft. concrete walks. Amount of cost exclusive of land damages, $135,000. City applying to Government for allowance of $100,000. Hon. F. Cochrane will report on the matter.

Port Arthur, Ont.

The Canadian Northern Railway Co. contemplate the construction of a steel dock to cost $40,000. Address, King st., Toronto. Plans are being considered.

Prince Rupert, B.C.

Work will start at once on erection of a dry dock for Grand Trunk Pacific Ry. Address, Commissioners of National Transcontinental Railway, Montreal.

Sault Ste. Marie, Ont.

Tenders are called for reconstruction of approach to wharf. Plans, etc., at Department and at offices of District Engineer at Toronto, Windsor and with local postmaster. Received by secretary until 4 p.m. Feb. 28th. Dept. of Public Works, Ottawa. Secretary, R. C. Desrochers.

Toronto, Ont.

Estimates are being prepared for new bridge, Gerrard street, over Don. City Engineer asked to report on steel structure at $155,000 or a concrete at $200,000 by the works committee.

Tenders will be received by Mayor Geary until March 7th for grading and construction of concrete subway abutments and wing walls. Bridge Engineer, E. L. Cousins.

Vancouver, B.C.

The Canadian Pacific Railway propose the following construction to cost $5,000,000: Field to Kamloops (260 miles) cedar cribs on Kicking Horse and Illecillewat rivers replaced by concrete; 80 lbs. steel rails replaced bp 85 lb., $75,000; 3 rock crushing and gravel wasring plants will be built; 10 bridges built on concrete piers and abutments; oil tanks and pumping stations installed at Field, Revelstoke, Kamloops and intervening stations; all snow sheds re-built.

Winnipeg, Man.

Canadian Northern Railway Address, Winnipeg Office, C. N. R.; will erect new stations at Ft. Frances, Dauphin, Moose Jaw, Calgary and enlargement of Saskatoon station.

CONTRACTS AWARDED

Dartmouth to Dean, N.S.

Nova Scotia Railway. General contractor, M. P. & J. P. Davies, Quebec, Que. Sub-contractors, Cavicchi & Pagganno, Halifax, N.S. Construction already started and will take 2 years. Dept. of Railways and Canals. Secretary, L. K. Jones, Ottawa.

Le Pas to Split Lake

McMillan Bros. of Winnipeg have secured sub-contract for 185 miles of Hudson Bay railroad. General contractors, McArthur Bros., Winnipeg. Construction to be done this year. Foley Bros., Winnipeg, and Angus Sinclair, Toronto, may be addressed in reference to this work.

Walkerton, Ont.

Steel bridge, 10th con. Brant. County Engineer, Jas. Warren, Walkerton; steel work, Hunter Bros., Kincardine; concrete abutments, Hugh Watt, Paisley. 2 spans, 150 ft. length, 16 ft. roadway, concrete floor.

Public Buildings, Churches, Schools, etc.

Aylmer, Que.

Plans are being prepared for new race track and club house to cost $30,000 (on Aylmer Electric Line). Architect, Herbert George, 11 Fourth avenue, Ottawa.

Bassano, Alta.

Plans are being prepared for irrigation building to cost $20,000, for Canadian Pacific Railway. Divisional Engineer, N. E. Brooks. A new freight shed will also be erected.

Brandon, Man.

Plans have been submitted for church to cost $40,000 for St. Matthew's Anglican Church. Secretary of Committee, Reg. Unicum, Brandon. Sand mould red brick, white stone trimmings, steam htg., seating capacity 500. Building to be commenced this season. Plans considered on Feb. 15th.

Calgary, Alta.

The Commercial Travellers Association are contemplating new travellers headquarters to cost $150,000, First st. E. President, W. G. Fowler, Calgary. Secretary, D. C. Russell, Calgary. Five-storey building with offices and club rooms. No plans are prepared yet.

The Independent Order of Good Templars are contemplating the erection of a new Hall to cost $100,000. Chief Templar, C. A. Horner.

A by-law to expropriate 5 acres and erect an Incinerator will be submitted at an early date. Engineer, J. T. Child.

Coboconk, Ont.

The Coboconk School Board plan to erect an up-to-date brick school. Address, T. C. Birchard, Coboconk.

Compton, Que.

Trustees of Kings Hall Ladies College, Compton, Que., have decided to erect new college. Buildings to be on 15-acre site, on road between Sherbrooke and Lennoxville, Que.

Fernie, B.C.

A by-law will be submitted to erect a school to cost $40,000 for Fernie School Board Secretary, S. W. Barclay.

City to raise $15,000, remainder a grant from provincial government.

Fort William, Ont.

The Salvation Army submitted a proposition to erect Metropole costing $15,000 if the city will contribute $7,000. Col. Caskin, chief officer in Western Canada.

Grand Falls, N.B.

Tenders closed Feb. 19th for interior fittings for Post Office and Customs. Plans and specifications to be seen on application to F. L. Dixon, clerk of Wks. D. H. Waterbury, St. John, N.B., Clerk of Works and at the Dept. Tenders to be accompanied by accepted cheque for 10 per cent. of amount of tender. Dept. of Public Works, Ottawa. Secretary, R. C. Desrochers.

Guelph, Ont.

Tenders are called for Y. M. C. A. Building. Chairman Commissioner, H. G. Cockburn, Telephone Bldg., Guelph. Architect, W. A. Mahoney, Telephone Bldg., Guelph. Received until noon, Feb. 28th on heating, plumbing, tile and marble work. Plans and specifications with architect.

Hamilton, Ont.

The Roman Catholic Episcopal Corporation plan to erect a new chapel. Rector, Rev. Dr. Mahoney, St. Mary's Presbytery, Hamilton.

Lambton Mills, Ont.

Toronto Golf Club, Coxwell street, have plans under way for a new club house to cost $60,000.

London, Ont.

The London Hockey Association will install a complete artificial ice plant. Wilbur H. Vining, of Vining's Drug Store, Dundas street, has the matter in hand.

Trustee Gammage's recommendation in committee, to have estimates prepared for a new public school instead of addition to Aberdeen school will be considered at special meeting of Board.

Montreal, Que.

The Canadian Society of Civil Engineers have sold their headquarters at 413 Dorchester street W., and will buy another site and construct a new building at an estimated cost of $100,000. The secretary of the Society is Professor C. H. McLeod, Montreal, and the president Mr. W. F. Tye, Toronto.

Thos. Belair, 1835a Rue Ontario, has been awarded contract for structural steel required for Riding School of Mr. Chamelet, cor. Aqueduct and Overdale streets, Montreal. John Nutt, general contractor.

Nelson, B.C.

Plans are being prepared for church to cost $30,000, for St. Paul's Presbyterian Church. Chairman of Committee in Charge, Captain D. C. McMorris.

New Glasgow, N.S.

Tenders are called until Feb. 29th for wooden lighthouse and pole lights, between New Glasgow and Pictou, N.S. Concrete and wood construction. For County of Pictou, N.S. Address Dept. of Marine & Fisheries, Ottawa, Ont.

North Battleford, Sask.

Plans are called for Collegiate Institute to cost $80,000 for High School, District 12 Sec.-treasurer, Hugh Mo-her, North Battleford. Plans, etc., received by secretary until March or thereabout.

Niagara Falls, Ont.

Mayor, C. C. Cole. Clerk, W. J. Seymour has been instructed to get information and prices on laboratory equipment for analyzing and sterilizing milk.

Ottawa, Ont.

Plans are prepared for Tuberculosis Hospital. Architect, A. L. Weeks, Can. Life Bldg., Ottawa. Hospital to be built on Lady Grey grounds.

Plans will be prepared for church, for Methodist Church, Ottawa, Glebe District. Pastor, Rev. Geo. S. Clendennen of Ottawa is chairman of building committee.

Owen Sound, Ont.

Plans will be prepared for new school to cost $30,000. Chairman, Jas. Leslie, Secretary, John Rutherford. Two-sty., brick.

Peterboro, Ont.

Sites have been chosen for two schools to cost $80,000, for Board of Education, Peterborough. Architect, F. E. Bartlett, 68 Murray street, Peterboro. West End School located at Weller and Monaghan road. East End School, Hunter and Concession streets. Probably brick, 12 to 14 rooms. Work not started. Board of Education in charge of arrangements.

St. Thomas, Ont.

Plans have been approved by Dept. of Education, Toronto, for extension to Collegiate to cost $27,000. Board of Education. Secretary, H. W. Tallman. Architect, J. T. Findley, St. Thomas. Six additional rooms, one an assembly hall.

South Vancouver, B.C.

Excavation will commence shortly for church to cost $15,000, Fraser avenue, for South Hill Baptist Church. Architect, G. Horel, 25th and Main streets,' Vancouver. Two towers and belfry.

Sydney, N.S.

A. N. McLennan, Dorchester street, plans to build a skating rink to cost $15,000. T. W. Publicover, Park street, Sydney. Architect, T. W. Spencer, Sydney, is mentioned. Address Publicover Block, Sydney. Rink to be 120 x 240 and equipped with modern appointments.

Toronto, Ont.

Property Commissioner Harris. Commissioner to report on advisability of city building a civic fruit market.

Tenders are open for Masonic Lodge, cost $32,000, Gerrard street east. Architects, Edwards & Saunders, 18 Toronto street. Three storeys, brick, concrete foundation, tar and gravel roofing, steam heating, combination lights, structural steel, cut stone trimmings, sidewalk lights, hardwood flooring.

Separate School Board contemplate the erection of a school, cost $20,000, Danforth & Carlaw. Brick, concrete foundation, steam heating, slate roofing, fireproofing.

Victoria Presbyterian Church, Medland and Annette streets, will erect a gymnasium. Pastor, Rev. D. T. L. McKerrol, 19 Law street. Plans will be prepared, ready to build in spring, when funds are raised, to cost $30,000.

The Independent Order of Foresters Temple Building, plan to erect a hall and auditorium, cost $100,000, 229 College street. Five storeys, 130 x 65, fireproof, brick and artificial stone, structural steel, art stone frame, marble, hardwood finish, skylights, fire escapes, fireproofing, metal lath, plate and art glass, galvanized iron cornice, boilers, passenger elevators, reinforced concrete.

Tenders are open for galleries, cost $4,000, for First Ave. Baptist Church, Toronto. The Board of Management will erect the galleries all round the auditorium.

Tenders are open for converting building into dance hall, cost $7,000, Elm st. near Elizabeth, for S. Rabinawitch, Beverley street, Toronto. Brick.

Victoria, B.C.

New tenders are called for church, Quadra and Mason streets, for St. John's Anglican Church. Architect, W. Ridgeway Wilson, Pemberton Building, Victoria. Changed plans call for brick and terra cotta. Tenders received by architect on general contract until March 5. Deposit of 2½ per cent. required.

Walton, Ont.

Tenders are called until February 26 for the erection of a church for Walton Presbyterian Church. Address R. H. Ferguson, Walton.

Wiarton, Ont.

Tenders will be called for post office, cost $15,000, Berford street, for Dominion Government. Post Office Department, Ottawa. Plans and specifications are prepared and tenders are to be called immediately.

Winnipeg, Man.

Tenders are called on school, for Swan River School District No. 1047. Secretary-treasurer, C. A. Lewis, Swan River, Man. Architect, E. D. Tuttle, 701 McArthur Block, Winnipeg. Six rooms, brick construction, concrete foundation, hot air heating, shingle roofing. Excavating, concrete and plumbing not called for.

Plans are being prepared for mission church, cost $40,000, for Scandinavian Church, Winnipeg, Man. Architects, Quandt & Creutzer, Vancouver, B. C. Plans will be completed in about a month.

Holy Trinity Church Congregation to erect a Sunday School on Graham ave. and Smith street. Three storeys, gymnasium probably on third floor with auditorium and club rooms. Cost $50,000.

CONTRACTS AWARDED

Bassano, Alta.

S. E. Whiting, Mayor of Bassano is excavating for opera house, cost $30,000. Brick, concrete foundation, steam heating, electric lighting, hardwood interior finish. Building 70 x 100 with 800 seating capacity. Owner is builder.

The Bassano Club contemplate making alterations to club, cost $10,000. President, J. D. Dennis, Bassano. General contractor, J. Carmody, Calgary. Electric light, steam heating, hardwood interior finish.

Montreal, Que.

Excavating has started for institution for the blind, cost $40,000, Notre Dame de Grace Ward, for Montreal Association for the Blind. President, P. E. Layton, St. Catherine street. Architects, Hutchison, Wood & Millar, 50 Royal Insurance Building, Montreal. General contractor, C. E. Deakin, 11 St. Sacrament street, Montreal. Steel work, Dominion Bridge Company, Limited, Lachine.

Foundations are in for theatre, cost $100,000, St. Catherine street, for the Canadian Amusement Company, Orpheum Building, Montreal. Architects, Ross & McFarlane, Beaver Hall Hill, Montreal. General contractor, C. E. Deakin, 11 St. Sacrament street, Montreal. Steel, Dominion Bridge Company, Lachine. Two storeys, 70 x 149, gas and electric lighting, tar and gravel roofing, two fire escapes, steam boiler.

Library, cost $150,000, on St. Denis street, for St. Sulpician Fathers, St. Denis street. Montreal. Architect, Eugene Payette, 108 Francois Xavier street, Montreal. 70 ft. high, 100 x 103. Contract for stone awarded to Cleveland Sandstone Co., Ltd. Masonry foundation, brick and stone and terra cotta, fireproofing awarded to M. Huberdean, 633 De Montigny E. Steel work contract tenders close February 24th.

Quebec, Que.

Immigration building, cost $425,000, for Dominion Government. Architects, Dominion Government engineering staff. General contractor, C. E. Deakin, 11 St. Sacrament street, Montreal. Two stys., 80 x 780, brick and stone on concrete piling. Piling, McArthur Piling Company, New York. Steel, Dominion Bridge Company, Limited, Lachine, Que.

Residences

Blenheim, Ont.

Tenders are called until March 1st for residence, cost $3,000, for Mr. Geo. Taylor, Blenheim. Architect, J. L. Wilson & Son, Chatham. Brick veneer, concrete foundation, electric light, hot air heating, shingle roof, oak and cypress finish. Two storeys, 28 x 31.

Brockville, Ont.

Plans are in progress for residence, cost $3,000, King street east, for A. C. Hardy. Architect, A. S. Allaster. Dressed native stone, stone foundation, electric lighting, hot water heating, metal and concrete roof, oak floors, whitewood finish; 2 storeys.

N. B. Colcock will erect a residence, cost $5,000, Hartley street. Architect, A. Stuart Allaster, Brockville. Granite, shingle, granite foundation, steam heating, electric lighting, shingle roofing, oak and southern pine finish. Two stys. and attic, 30 x 40 Rough sketches prepared.

Dr. R. L. Bowie has purchased a lot on King street east and plans to erect an office and residence early in the spring at a cost of $20,000.

W. H. Wood will erect semi-detached residence in fall of this year on Bethune street, to cost $5,000.

Dr. S. Gowan will erect a new residence, cor. Pine and Bethune streets, to cost $7,000.

Calgary, Alta.

Brown & Taylor, Box 1645, plan to erect a terrace on 16th ave. west. Brick veneer. 130 ft. x 40 ft. Cost $20,000.

A permit has been applied for apartments, cost $10,000, 16th ave. west, for Brown & Taylor, Box 1645, Calgary. Architect, owner. Two storeys, 38 x 50.

brick veneer, concrete foundation, steam heating, electric lighting, tar and gravel roofing.

Application has been made to erect two residences, cost $6,000, for A. O. Mabie, 32 Elma Block. Two storeys, 19 x 36, frame, concrete foundation, furnace heating, electric lighting, shingle roofing, hardwood interior finish.

Plans are being prepared for residence, cost $24,000, Bowness, for J. Hextall. Architects, Holman & Gotch, Herald Block. Two storeys, brick, concrete foundation, steam heating, electric lighting, shingle roofing, hardwood interior finish.

Plans are being prepared for apartment house, cost $10,000, 17th ave. west, for H. H. Whitehead. Architects, Holman & Gotch, Calgary. Two storeys, 80 x 45, brick, concrete foundation, steam heating, electric lighting, tar and gravel roofing. No contract let yet.

Plans are being prepared for residence, cost $9,000, Elbow Park. Architects, Holman & Gotch, Calgary. Two stys., 50 x 50, brick, concrete foundation, hot water heating, electric light, shingle rfg., hardwood interior finish.

A permit has been granted for residence, cost $4,000, Mt. Royal, for W. M. Chappelle, 1231 13th ave. west. Two storeys, 28 x 33, frame, concrete foundation, hot air heating, electric lighting, shingle roofing, hardwood finish.

A permit has been granted for residence, cost $4,000, Elboro Park, for Lea & Goulding, 231 15th avenue west, Calgary. Two storeys, 32 x 34, frame, concrete foundation, electric lighting, steam heating, shingle roofing, hardwood finish. Owner is builder.

Hamilton, Ont.

A permit has been granted to erect 2 apartment houses, cost $15,000, Park and St. Charles streets, for W. O. Sealy, 64 Hunter street west, Hamilton. Architects, Watt & Blackwell, 125 Lister Blk., Hamilton.

Tenders will be called for residence, cost $10,000, Eastbourne ave., for William Lees. Architects, Mills & Hutton, Bank of Hamilton Bldg., Hamilton.

Plans are being prepared for residence, cost $8,000, Sherman ave., for Controller Chas. Gardiner, Hamilton. Architects, Stewart & Witton, Hamilton. Pressed brick, stone trimmings, hardwood finish, slate roofing, hot water heating, combination fixtures, electric bells, modern plumbing. Tenders called shortly.

Dr. Paine, Caledonia, Ont., has purchased a site, corner Sherman ave. and King street, Hamilton, for erection of a residence and surgery.

Montreal, Que.

Foundation has started for two flats, cost $2,750, Milton street, for Raphael Nelli, 12 Crawford ave. Two storeys, 25 x 30, brick and frame, concrete foundation, gas lighting, furnace heating, gravel roofing.

Ottawa, Ont.

Plans are prepared for residence, cost $4,200, for C. Brooks, 4 Canal street, Ottawa. Brick veneer.

Regina, Sask.

A. M. Fraser, architect, has plans out for two residences on Toronto street, one on Osler street, several in the east end and also for an hotel in Craven, Sask

St. Catharines, Ont.

Plans will be prepared for pair of residences, cost $7,500, James street, for Mrs. Davidson, St. Catharines. Two storeys and attic, brick, stone foundation, gas and electric light, hot water heating, shingle roof, eight rooms.

Stellarton, N.S.

Tenders are called for fifty tenement houses, cost $1,375 each, for Acadia Coal Co., Stellarton, N.S. Wood and brick, concrete foundation, shingle roof, two storeys.

Toronto, Ont.

Plans are completed for pair residences, cost $60,000, Heath street, for P. Coltman, 167 Robert street, Toronto. Architect, J. G. Hedges, 86 Clinton st., Toronto. Two storeys and attic, semi-detached, brick.

M. Cooper, 5 Keele street, will build a new house, 2½ stys., brick, stone foundation, on Empress Crescent, to cost $4,000.

Plans are completed for converting residence into apartments, cost $10,000, Church street near Gloucester street, for J. M. Cowan, 65 Adelaide street west, Toronto.

Tenders are open for apartments, cost $75,000, Queen street west, for Weismiller & McKenzie Bros., 1395 Queen street west, Toronto. Three storeys, brick, stone trimmings, concrete foundation. Owner is builder.

R. Henderson, 46 Emerson ave., will build three attached dwellings, brick, shingle roofing, on Uxbridge ave., to cost $6,000.

Plans are in progress for three attached dwellings, cost $6,000, 28 McKay ave., for T. J. Bowen, 817 Dundas street. Architect, W. A. Langridge, 817 Dundas street. Two storeys, brick.

Sketches are in progress for four attached residences, cost $8,500, Defoe st., for H. Galbraith, 19 Major street, Toronto. Architect, J. Gladwin Hedges, 86 Clinton street, Toronto. Two stys., 80 ft. 6 in. x 30, stone foundation, hot air heating, combination lighting; cut stone, skylights, mantles, stucco, plate glass, slate roofing.

Plans are being prepared for apartment house, cost $18,000, King and Jamieson ave., for S. King, 13 Wellington street east. Architect, Len. Foulds, 2 Leader Lane. Three-storey and basement, 158 x 40, brick, tar and gravel rfg., hot water heating, combination lighting, artificial stone trimming, mantles and tiles, hardwood finish, plumbing, phone exchange.

Plans are drawn for three attached residences, cost $6,000, for J. Lutz, 544 King street. Architect, Len. Foulds, 2 Leader Lane. Brick, shingle roofing, hot air heating, combination lighting, brick mantles, hardwood finish.

Tenders are open for residence, cost $4,500, Keele and Wrigrt, for J. E. Cassan, 91 Queen street east, Toronto. Architect, H. Simpson, 17 Toronto street. Two storeys, brick, stone foundation, stucco, plate glass, shingle roofing, sun room and billiard room.

Tenders are open for four suite apartments, cost $7,500, N. E. corner Indian road, for Misses Sanderson, 405 Spadina ave., Toronto. Architect, J Hunt Stanford, 17 Westmoreland ave. Two stys., brick, slate roofing, electric light, structural steel, Roman stone, mantles and tiles, hardwood finish, stucco, plate and art glass, marble.

Tenders are open for detached apartment house, cost $36,000, on Melbourne street, for C. E. Proctor, 65 Elm Grove avenue. Two storeys and basement.

Tenders are open for two detached dwellings, cost $6,800, Springhurst ave., for Jno. Grandin & Son, 138 Clinton st., Toronto. Architect, J. Hunt Stanford, Yonge Street Arcade, Toronto.

Tenders are open for a 15-suite apartment house, cor. King and Jamieson ace., for Solomon King. Architect, Len. Foulds, Leader Lane, Toronto. Three storeys, buff brick.

Plans are drawn for pair dwellings, cost $6,000, s.w. cor. Monroe Park ave. and Queen street east, for E. Gagnon, 146 Riverdale ave. Architect, P. H. Finney, 43 Victoria street. Semi-detached, brick.

Vancouver, B.C.

Plans will be ready in March for residence, cost $17,000, Matthews ave., for R. S. Lennie, Architects, Thompson & James, 412 Seymour street, Vancouver. Tenders on general contract called in a month and will not include plumbing or heating. Three storeys, frame.

Alexander & Stone, 53 Fairfield Bldg., Vancouver, plan to erect apartments on Main, 14th and Howard streets, cost $75,000. Three storeys and basement, reinforced concrete and mill construction, hot water heating plant, provisions for bowling alley, cafe.

Winnipeg, Man.

Tenders are called until February 24 for a residence, 1½ storeys, 24 x 27, frame, stone foundation, hot air heating, electric lighting, shingle roofing. Architect, E. P. Tuttle, 701 McArthur Street, Winnipeg.

CONTRACTS AWARDED

Calgary, Alta.

A permit has been granted for residence, cost $5,000, Mt. Royal, for Stubbs & Wallace, 1324 12th avenue west. Two stys., 30 x 34, brick veneer, con. foundation, electric light, hot water heating, shingle roofing. Owner is builder.

A permit has been granted for apartments, cost $12,000, 6th ave. west, for D. W. Gillies, 332 6th ave. west. Two storeys, 43 x 64, brick veneer, concrete foundation, steam heating, electric lighting, tar and gravel roofing, hardwood finish. Owner is builder.

Toronto, Ont.

Icehouse, cost $8,500, St. Clair ave. & Weston road, for Swift Canadian Company. Builder, Wells & Grey, Confederation Life Bldg. One storey, frame and concrete, trucks, conveyor, freight elevators.

Business Buildings and Industrial Plants

Brittania, Ont.

The Ottawa Concrete Homes Co., 64 Sparks street, Ottawa, plan to erect a warehouse and works here, for cement products.

Calgary, Alta.

Plans are being prepared for eight-storey office building, cost $100,000, for

Mr. McDougal. McDougal Block, Calgary. Architect, A. A. Rose, 20 Lineham Block. Eight storeys, 25 x 130.

Plans are being prepared for garage, for McLaughlin Carriage Co., Calgary. Architect, D. S. McIlroy, Calgary. Building 50 x 130.

Tenders are called until March for business block, cost $80,000, West Calgary, for Shelleys Bakery, Architect, D. S. McIlroy, 8th avenue west. Brick, concrete foundation. electric light, steam heat, tar and gravel roofing, two stys., 100 x 130.

Plans are being prepared for business block, cost $400,000, 8th ave. W., for J. S. Mackie, 2nd st. w. Arch. Mr. Teague, Dominion Bank Block, Calgary. Ten storeys, 130 x 100, steel, fireproof throughout, concrete foundation, steam heating, electric lighting, tar and gravel roofing, hardwood interior finish, fire escapes, vaults.

Chamcock, N.B.

The Canadian Sardine Co., St. Andrews, are calling for tenders for fish canning factory. Director, F. P. McColl, St. Andrews. Sec.-treas., Chas. Haycock, St. Andrews. Reinforced concrete construction, electric light, steam heating, tar and gravel roofing, reinforced concrete floor, three storeys, 189 x 75, and 55 x 37, sprinkler system, dynamos, engine and boiler, can making and sealing machinery.

Cote St. Paul, Que.

New tenders will be called for addition to hotel for J. H. Crevier, Power Bldg., Montreal. Architect. Dalbe Viau, 76 St. Gabriel street, Montreal. Three storeys, concrete foundation, stone construction, hot water heating, electric lighting, plate glass, electric bells, hardwood interior finish. Close February 23rd.

Hamilton, Ont.

Hamilton Health Association. President, W. J. Southam, Spectator Bldg., will erect fireproof structure to replace laundry, disinfecting plant and other buildings recently destroyed by fire. No architect appointed yet. Cost $5,000.

The Armor Steel Company, Winton Place, Cincinnati, Ohio, President, J. E. Jones, plan to erect a steel plant and it is stated that location in Hamilton is favorably considered. Company manufacture special steel castings. Cost of new plant is estimated at $150,000.

Ingersoll, Ont.

The John Morrow Machine Screw Co. plan to build and equip factory for manufacture of steel twist drills. Work to start as soon as materials are procured.

Jordan Station, Ont.

The Canadian Canners, Limited, have purchased a site for new canning factory. Address, E. R. Marshall, M.P., St. Thomas, Ont.

Mitchell, Ont.

Wettlaufer Bros., Spadina ave., Toronto, are having plans prepared at once for erection of an extension to the foundry.

Montreal, Que.

Tenders will be called about March 1 for office building, St. Antoine street, for Canadian General Electric Company, 81 St. Peter street, Montreal. Architects, Ross & Macfarlane, 1 Belmont street, Montreal. Five storeys, 50 x 150, brick, stone facings and mill construction trimmings, concrete foundation, steam heating, tar and gravel roofing, freight elevators and dumb waiters, marble and tile in vestibules and lavatories.

Messrs. Aird & Son, 583-7 St. Timothee street, Montreal, have a new factory building and machinery under consideration.

Preparations are under way for factory for Canadian Boomer & Boschert Press Co. Ltd., Manufacturers of hydraulic presses, 18 Tansley street, Montreal. Architects, Hutchinson Wood & Miller, Royal Insurance Bldg., Montreal. One storey, 116 x 35, concrete construction, on steel frame. Tenders are received by architects.

The Bank of Montreal, head office Montreal, have a site purchased, St. Lawrence Boulevard, near Mt. Royal avenue. 10,412 square feet, and will erect a new bank building this summer. A temporary office is being fitted up for present use.

Office building, cost $300,000, will be erected on McGill street east and Notre Dame, for McGill St. Building Company, 32 Bank of Ottawa Building, Montreal. Architect, R. E. Bostrom, 132 Board of Trade Bldg., Montreal. Steel, concrete, brick, stone, terra cotta, fireproof construction, steam heating, overhead feed system, electric light, tar and gravel roof, marble, tile and hardwood floors, fire escapes, vaults, refrigerators, concrete foundation, terra cotta flooring and tiles, terra cotta arches, polished granite, white and green terra cotta front, three elevators, 1 freight, ornamental iron stairs with marble tread, metal window frames, kalemein doors, glazed terra cotta, wired glass, tile and marble toilets. Ten storey, 111 x 65. Tenders close March 1, 1912.

Niagara Township, Ont.

Sanitary Packing Co., Toronto, contemplate the erection of a canning factory. Director, W. T. Trethewey, Toronto. Manager, Dr. S. E. Boulter, Niagara Falls South. Complete canning machinery required Company will also require half mile railway spur to factory.

Napanee, Ont.

Plans have been prepared for new shops for Dominion Rock Drill Company, Napanee, and work will commence as soon as the spring opens. Structural steel frame and concrete walls. Estimated cost $25,000. Address E. R. Beckwith, C.E., Kingston, Ont.

North Bay, Ont.

Tenders are called for office and residence, cost $6,500. for Dr. E. Brandon. Architect, H. W. Angus, North Bay. 2½ storeys, 36 x 50, solid brick, stone trimmings, stone foundation, hot water htg., electric lighting, galvanized iron roof, oak interior finish. Received until March 1st.

Plans are being prepared for business block, cost $6,000, for A. La Salle, Architect, H. W. Angus. Two storeys and basement, 33 x 46, stone foundation, solid brick, steel, hot water heating, electric light, patent roofing.

Outremont, Que.

Foundations are in for woodworking factory for Thomas Mfg. Co., of St. Thomas, Ont. Architect, E. W. Barnes, 2126 Mance street, Montreal. Five stys., 120 x 50, mill construction. Tenders called first week in March.

Peterboro, Ont.

Tenders have been called on factory, cost $30,000, for Canadian General Electric Co., King street west. Local manager, E. G. Patterson. Two storeys and basement, 225 x 80, brick, electric light, freight elevator. Factory part storehouse, part manufacturing.

Russell, Ont.

A new brick industry has been established, 18 miles east of Ottawa, to be known as the Russell Shale Bricks, Limited. President, G. F. Hodgins, Shawville, Que. Vice-president, A. Fraser, K.C., Castle Bldg., Queen street, Ottawa. Capacity 25,000 brick per day.

Sherbrooke, Que.

Tenders have been called for milk depot, cost $7,000, Belvidere, for Sherbrooke Pure Milk Co. Two storeys, 45 x 60, concrete blocks, steam heating, gravel roofing, refrigerators. Foundations are being put in.

A by-law carried granting free site and exemption from taxes to the Sherbrooke Iron Works Co. Firm manufactures paper machinery and general iron works. Tenders will be called later for construction work. Estimated cost $35,000.

Swift Current, Sask.

Plans are completed for erection of a warehouse (Implements), for Massey-Harris Co., Toronto, Ont. Two storeys, 100 x 150, brick, tar and gravel roofing, steam heating, freight elevator.

Sydney, N.S.

Tenders closed February 15th for stores and office, cost $11,000, for M. stores, and office, cost $11,000, Charlotte st., for M. Lubchnski, Whitney Pier, Cape Breton. Arch., F. W. Spencer, Sydney, N.S. 2-storeys, 40 x 72, brick and reinforced concrete foundation, steam heating, electric lighting, "Barrett Specications." roofing, hardwood floors, hemlock interior finish, steam heating boiler.

Tenders are called for business block, cost $10,000, Cor. Charlotte and Prince street, for D. J. Buckley, druggist, Charlotte street, Sydney. Architect, J. N. McDonald, St. John, Nfld. Brick and concrete construction, concrete foundation, hot water heating, electric lighting. Barrett ·specifications roofing. tile and hardwood floors, two storeys, 65 x 29 6. Boiler and equipment.

Plans have been prepared and tenders are called for business block and residences, cost $12,500, for Bernard Green, Caledonia Main Glace Bay, N.S. Architect, F. W. Spencer, Sydney, N.S. 2 storeys, 40 ft. x 88 ft., brick and reinforced concrete construction, concrete foundation, steam heating, electric lighting, "Barrett specifications" roofing, hardwood floor, hemlock interior finish, boiler and equipment. Received by B. Green, Glace Bay, until February 29th.

J. F. Merchant and Sons, Charlotte street, plan to erect a new store to cost $15,000. Two storeys, 43 x 100, reinforced concrete, fireproof, concrete foundation, steam heating, electric lighting, gravel roofing, hardwood interior finish, steam heating.

Tenders are called for business block, stores, cost $11,000, Charlotte st., for J. E. Burchell, J. J. Turnbull, and Thos. Cossileno, Sydney, N. S. Architects, Harris & Horton, Halifax, N. S. Two storeys, 40 x 70, reinforced concrete and brick construction, concrete foundation, hot water heating, electric lighting, "Barrett Specifications" roofing, tile and hardwood floors, steam heating boiler and equipment. Received by J. Burchell until March 1st.

Thorold, Ont.

A syndicate, for which Jas. Battle is a trustee, has purchased land south of here for a paper mill, near G. T. R. Negotiations in progress with town regarding assessment, which will be voted upon on the 28th inst. It is stated 150 hands will be employed. D. J. C. Munro, Clerk, has particulars.

Tillsonburg, Ont.

Mayor Maybee plans to erect a business block this spring. Pressed brick, 40 x 120, electric light, steam heating, store fixtures. F. H. Brewster, Tillsonburg, will occupy one of the stores.

Toronto, Ont.

Tenders are open for addition to cold storage plant, Colborne street, for Manning Cold Storage Co., Colborne street. Architect, Len. Foulds, 2 Leader Lane. Deepening and extending cellar, brickwork, larger elevator, insulating material required.

Tenders are open for three stores and residence, cost $9,500, cor. Gerrard and Ashdale, for Brown & Shrubb, 28 Victor ave., Toronto. Architect, O. A. F. Hunt, 1125 Dovercourt road, Toronto. Three storeys, brick.

Tenders are open for hat factory, 1402 Queen street east, for Ernest Jackson, 5 Harvard ave. One storey, and basement. Brick, tar and gravel roofing, concrete foundation, reinforced concrete floor, galvanized iron cornice.

Plans are completed for repairs to factory, cost $8,000, Simcoe and Pearl streets, for Allen Mfg. Co., Simcoe and Pearl streets. Architects, Burke, Horwood & White, 28 Toronto street. Four storeys, brick. Recently destroyed by fire.

Tenders are open for office building, cost $16,000, for A. M. Orpen, Carleton & Sherbourne streets. Architect, A. T. Strathy, 123 Simcoe street, Toronto. Concrete and brick, asbestos roofing, electric lighting, hardwood finish, fireproofing, vaults, plate and art glass, plumbing, asbestos roofing.

Tenders are open for store and residence, cost $5,000, 371 Broadview ave., for Mrs. E. J. Boyd, 369 Broadview ave., Toronto. Architect, P. H. Finney, 43 Victoria street. One storey, brick, cut or artificial stone, store fronts, mantles and tiles, hardwood finish, plate and art glass

Plans have been revised for warehouse, cost $10,000, 141 Berkeley street, for Hamilton Brewing Association, 141 Berkeley street. Architect, H. E. Hand, 15 Janes Bldg. Two storeys and basement, brick, concrete foundation, structural steel, cut stone, rolling steel doors, art glass, sheet metal, cornice, paving brick floors.

Tenders are open for alterations to abattoir, cost $20,000, Albany road and Gunns road, for Gunns Limited, Albany road. Architect, G. H. Miller Company, 59 Yonge street. Two storeys and basement, brick, concrete floors, structural steel, cut stone, machinery, concrete footings, freight elevators, tar and gravel roofing.

Tenders are open for factory, cost $28,000, on Dundas street, for General Fire Extinguisher Co., Dundas street. Architect, F. H. Herbert, 65 Adelaide street east. Three storeys, brick, waterproofing, metal doors, wire screens, fences and gates, counters, structural iron, skylights, cut stone, bush hammered face, terra cotta, boilers, concrete, garage and approaches concrete, metal sashes, wall hangers, plastic relief work, plate and art glass, galvanized iron cornices, ornamental iron, electric freight elevator, hoisting plant wanted by contractor. Insurance required.

Tenders are open for warehouse, cost $20,000, 60 Huron street, for Samuels & Son, 95 St. Patrick street. Architect, Len. Foulds, Leader Lane. Three stys., brick.

Vancouver, B.C.

Dr. D. H. Wilson, 1060 Chilco street, Vancouver, will erect a business block, Homer and Dunsmuir streets. Architects, Dalton & Eveleigh, 615 Hastings street west, Vancouver. Arrangements already made for letting contract.

Plans have been prepared for store & apartment house for Lun Yick Co., 51 Pender street east, 26-46 Pender street east, Vancouver. Architect, J. G. Price, Holden Bldg., Vancouver. Seven stys., brick, 50 x 120, stores on ground floor, hot water heating, hot and cold water in apartments. Architects in charge.

Victoria, B.C.

A. H. Harman, 1207 Langley street, has purchased a site on Langley street, next Bank Exchange, for erection of an office building.

Winnipeg, Man.

The Winnipeg Ceiling & Roofing Co. plan additions to roofing factory, C.N.R. tracks and Desantels street, Winnipeg. Manager, W. J. McMartin. Work to start in spring, machinery purchased. Present plant, brick construction.

CONTRACTS AWARDED

Bassano, Alta.

J. B. Gunn Co. (Grain Exchange), is excavating for warehouse. Two storeys, 50 x 130, brick, electric lighting.

Garage, cost $8,000, for M. J. Cochlin, Bassano. Contractor, J. Carmody, Bassano. Fireproof construction, concrete foundation, electric lighting, tar and gravel roofing.

Calgary, Alta.

A permit has been applied for to erect stores and apartments, cost $100,000, Sunnyside, for Brown and Taylor, Box 1645, Calgary. Architect, owner. Builder, owner. Two storeys, 45 x 45, brick veneer, concrete foundation, steam heating, electric lighting, tar and gravel roof, rardwood finish.

Montreal, Que.

Frontenac Brewery, for Frontenac Breweries Limited. President, Joseph Beaubien, Liverpool, London & Globe Bldg., Montreal. Architect, Paul Ott, 50 Church street, New York. Two artesian wells, The Wallace Bell Company, Ltd., 78 Mitcheson street, Montreal. Plant capacity 200,000 bbls. per annum (6,000,000 gals.).

Offices and stores, Notre Dame and St. Sulpice, for J. O. Gravel, 59 Mansfield street, Montreal. Architects, Hutchison, Wood & Miller, Royal Insurance Bldg., Montreal. General contractor, C. E. Deakin, 11 St. Sacrament street. Steel, Dominion Bridge Company Ltd., Lachine. Ten storeys, 50 x 75, stone, brick, steel, concrete, concrete and stone foundation, Ohio sandstone, grey canyon or limestone facing, steam heating, electric lighting, gravel roofing, birch floors, marble halls, two elevators and modern appointments. Work is not yet started.

Work will start in spring on extension to brass foundry, cost $9,500, St. Patrick street, for C. O. Clark & Bros., 1510 St. Patrick ave., Montreal. Architects, Ross & McFarlane, 1 Belmont st., Montreal. Excavation contractors, Shearer, Brown & Wills, 225 St. Patrick street, Montreal. Two storeys, 51 x 84, plastic brick, concrete foundation, hot water heating, gas lighting, tar and gravel roofing, mill floors.

Store and residence, cost $9,700, Masson and 5th ave., for H. J. Hague, Merchants Bank Bldg., James street. Architect, Cox & Amos, 112 Mansfield street, Montreal. General contractor, T. Lessard & Sons, Ltd., 191 Craig street east, Montreal. Two storeys, 24 x 60, foundation brick on rock, hot water heating, electric lighting, tar and gravel roofing, plastic and pressed brick.

A. Chaumont, 2877 St. Lawrence Blvd., is excavating for store and two flats, cost $5,000, St. Lawrence Blvd. Three storeys, 25 x 86, stone front, concrete foundation, gravel roof.

Brewery, Notre Dame street east, for J. H. R. Molson & Bros., 906 Notre Dame st. E. Architect, owner. General contractor, J. H. Hutchinson, Bourget st., Montreal. 1-storey, 42 x 60, brick, concrete foundation, steam heating, electric lighting, gravel roofing.

Stables, Delorimier and Craig east, for J. H. R. Molson & Bros., 906 Notre Dame street east, Montreal. General contractor, E. G. M. Cape, Beardmore Bldg., Montreal. Stable fittings, Warden King Co., Maisonneuve. Steel work, Dominion Bridge Co., Lachine. Three stys., 260 x 75, brick and steel construction, concrete foundation, steam heating, electric lighting, double concrete, tar and gravel roof, reinforced concrete floors, 150 stalls, garage, metal windows and doors, terra cotta walk, cement plaster, elevator. Tenders received by owner.

Port Alberni, B.C.

An addition is planned to hotel for A. F. Waterhouse, Sumas Hotel. Builder, G. C. Mesher & Co., Pemberton Block, Victoria. Manager, H. C. Ferree. 3-sty., added, steel and reinforced concrete, faced with pressed brick—48 rooms and three stores—inside walls, wood and metal laths.

Toronto, Ont.

Tenders are open for stores and dwellinsg, cost $6,500, Ulster street near Manning avenue, for Mr. Louis G. Weiss, 463 Manning ave. Architect, Wm. Brown, 122 Garnet ave. Builder, Wm. Brown. Three storeys and basement, brick, shingle roofing.

Garage, cost $3,000, cor. Victoria and Shuter streets, for H. Ryrie, Yonge and Temperance streets, Toronto. Architects, Burke, Horwood & White, Toronto street. Builder, Witchall & Sons, Toronto.

Vancouver, B.C.

Business building, cost $250,000, for London & British North America Limited. Architect, J. L. Putnam, (Somervell & Putnam). Canadian Ferro Concrete Construction Company, 744 Hastings street west, Vancouver. Nine stys., cream terra cotta front.

Walkerville, Ont.

Work has started on paint factory, cost $20,000, Argyle road, for Dominion

(Continued on page 70)

Tenders and For Sale Department

To Architects and Engineers

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect. No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

Relaying Rails For Sale

12 miles 56 and 60 lb. per yd. with fish plates.
10 miles 80 lb. per yard with angle bars.
4 miles 65 lb. per yard with fish plates.
Also 12, 16, 20, 25 and 50 pound.
New, light rails, all sections, in stock.

JNO. J. GARTSHORE,
58 Front Street West,
Toronto, Ont.
7-8

Crushed Stone for Road Work

The City Council of the City of St. Catharines invite tenders for about 200 cubic yards of 2-inch crushed stone, in carload lots, as required F.O.B. St. Catharines. Samples and marked tenders to be in subscriber's hands not later than February 28th, 1912.

R. D. BROWN,
City Engineer.
8

TENDERS WANTED

Cast Iron Pipe

Sealed tenders addressed to T. W. Brooke, Esq., Chairman, Water Commissioners, Windsor, Ontario, will be received by the undersigned up to 12 o'clock noon on **Monday, February 26th, 1912**, for 100 tons and upwards of cast iron water pipe, size from 6-in. to 12-in., and according to standard weight and thickness. All pipe to be tested to 300 lbs. per square inch. Delivery of 50 tons to begin by March 20th and continue as required.

A certified cheque for $200 must accompany each tender, which cheque will be returned at once to the unsuccessful tenderer, but in the case of the successful tenderer will be held as forfeit until the contract is completed.

The right is reserved to reject any or all tenders.

W. A. HANRAHAN,
Secretary.
Windsor, Ont., Feb. 9, 1912. 7-8

Tender

Tenders will be received up till twelve o'clock noon, **Monday, February 26th**, for the Heating, Plumbing, and Tile and Marble work in the erection of the Y. M. C. A. Building, Guelph.

Plans and specifications may be seen at the office of the architect, W. A. Mahoney, Telephone Building, Guelph.

Lowest or any tender not necessarily accepted.

Tenders to be addressed to

H. G. COCKBURN,
Chairman Bldg. Committee,
Telephone Bldg., Guelph.
8

Tenders for Abutments and Steel Bridge or for Arch Bridge

Sealed tenders addressed to the Clerk of Saugeen, Port Elgin P. O., will be received up to **Tuesday, the 27th day of February, 1912**, for the following:—

1. Abutments and Reinforced Concrete Floor.
2. Steel Superstructure.
3. Arch Bridge.

For a bridge 90 feet span over Mill Creek near Port Elgin.

A marked cheque for five per cent. of contract price payable to Treasurer, Saugeen Township, shall accompany each tender, which shall be held as security for the accepted tender and will be returned with unaccepted tenders.

The lowest or any tender not necessarily accepted.

Plans and specifications may be seen at the Clerk's office, Port Elgin, or the Engineer's office Owen Sound.

R. McDOWALL, C.E., Engineer.
F. W. ELLIOTT, Clerk. 7-8

TENDERS

FOR

Coxwell Avenue Subway

Sealed tenders on prescribed forms will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, up to noon on **Thursday, March 7th, 1912**, for the grading and the construction of the concrete abutments and wing walls for

COXWELL AVENUE SUBWAY

Specifications and plans may be seen and forms of tender may be obtained on application to the Department of Railways and Bridges, City Engineer's Office, Toronto.

Tenderers shall submit with their tender the names of two sureties, or in lieu of said sureties the bond of a guarantee company, approved of by City Treasurer.

The usual conditions relating to tendering as prescribed by city by-law must be strictly complied with.

Envelopes containing tenders must be plainly marked on the outside as to contents.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman, Board of Control.
City Hall, Toronto,
February 10th, 1912. 8

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
Chicago, Ill.
t.f.

CITY OF SASKATOON

Tender for Materials

Sealed tenders, addressed to the City Commissioners, and endorsed according to the material tendered on, will be received up to 12 o'clock noon on **Friday, March 1st, 1912**, for the following:—

Contract No. 105—Furnishing Sewer Pipe and Junctions.
Contract No. 106—Furnishing Cast Iron Pipe and Specials.
Contract No. 107—Furnishing Manhole and Catch Basin Frames and Covers.
Contract No. 108—Furnishing Valves and Hydrants.
Contract No. 109—Furnishing Material for Water Connections, including Lead and Galvanized Iron Pipe, Corporation Brass Goods and Service Boxes.

The Corporation reserves the right to reject any or all tenders.

All information may be obtained on application to George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., Feb. 7, 1912. 7-8

CITY OF SASKATOON

Electrical Equipment

Sealed tenders, addressed to the City Commissioners, and endorsed "Tender for Electrical Machinery," will be received up to twelve o'clock noon on **Friday, March 8th, 1912**, for the following apparatus:—

5—500 B.H.P. Water Tube Boilers.
5—Sets of Automatic Stokers.
Induced Draft Plant and Duplicate Plans for same.
Economizers for 2,000 H.P. capacity.
2—Feed Pumps.
All necessary equipment for the above.
1—2,000 K.W. High Pressure Steam Turbine with Condenser, Air Pumps, and necessary equipment.
2—75 K.W. Turbine Exciters.
1—Generator Panel.
2—Exciter Panels.
With all necessary cables and apparatus from Turbine to Switchboard.

Instructions to Bidders and forms of tender will be furnished on application.

The lowest or any tender not necessarily accepted.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., Feb. 8, 1912. 7-8

Tenders Wanted

Sealed tenders addressed to J. A. Smith, Clerk of the Township of Brantford, will be received up till noon on Saturday, the **24th** day of **February, 1912**, for a steel bridge to be erected over Fairchilds' Creek in the Township of Brantford.

The lowest or any tender not necessarily accepted.

Specifications also on file at office of "Contract Record," Toronto, Ont.

J. A. SMITH,
Township Clerk.
Dated February 8, 1912. 7-8

For Sale

Electric light machinery in first-class running condition.

One Goldie & McCulloch 50 H.P. Engine.

One 60 H.P. Boiler.

One 60 K.W. 125 Cy. Dynamo and Exciter.

Reason for selling now using Hydro-Electric power.

No reasonable offer refused.

J. H. TAYLOR,
Sec. W. P. & L. Com.,
8-9 Weston, Ont.

CITY OF BRANTFORD

Tenders for Sewer Pipe

Sealed tenders addressed to Ald. Samuel Suddaby, Chairman of the Board of Works, in care of the City Clerk, Brantford, Ontario, will be received till 12 o'clock noon on Thursday, **February 29th, 1912**, for the supply of sewer pipe required by the City of Brantford during 1912.

Specifications may be seen and instructions to bidders and forms of tender obtained on application to the City Engineer.

Each tender must be accompanied by a marked cheque, payable to the order of the City Treasurer, for the amount called for in the form of tender.

The lowest or any tender not necessarily accepted.

T. HARRY JONES,
City Engineer.
City Hall, Brantford,
February 19th, 1912. 8

Corporation of the CITY OF WESTMOUNT

City Surveyor's Department

Tenders are invited for the construction of the following works:—

(A) Contract No. 13—Intercepting sewer, Western avenue.

(B) Contract No. 12—Paving of Western ave.

Drawings, general conditions, specification, schedule and form of tender can be seen at the City Surveyor's office on and after February 19, 1912

Copies of drawings, general conditions, specifications, schedule and form of tender can be obtained on payment of fifteen dollars for each contract, which will be refunded on receipt of a bona fide tender and return of the aforesaid documents.

Sealed tenders marked with the respective contract numbers are to be deposited with the City Clerk, City Hall, Westmount, not later than twelve noon, March 11th, 1912.

Tenders will be opened by the Mayor sitting in public at 5 p.m., March 11th, 1912.

The Council does not bind itself to accept the lowest or any tender.

ARCH. CURRIE, C.E.,
8-10 City Surveyor.

Concrete Mixer For Sale

FOR SALE—A half-yard Concrete Mixer, only used a few months. Will mix 100 cubic yards per day. Will sell cheap. Apply Box 441, Contract Record, Toronto, Ont. 8

Business Opportunity

WANTED—Gentleman interested in Contracting, Architecture and Engineering, to form syndicate for new vacuum steam heating system recording twenty inches. For full particulars apply Box 442, Contract Record, Toronto, Ont. 8

Tenders for Steel Bridge

Tenders will be received up till 2 p.m.,**March 4th, 1912**, at Gilles Hill, for the erection of a Steel Bridge of one span, 70 feet, 16 ft. roadway, over North Branch of the Saugeen River, about 1½ miles from Chesley. Also for the erection of two Concrete Abutments for the same, about 400 cubic yards.

Plans and specifications may be seen with James Warren, A. L. S., Walkerton.

An accepted bank cheque for $100 must accompany each tender.

The lowest or any tender not necessarily accepted. Address tenders to

S. K. EWART,
Chesley P. O., Ont.
February 14, 1912. 8-9

Tenders and Designs for an Aqueduct

Canadian Pacific Railway Company

Department of Natural Resources Irrigation Branch

Sealed tenders, addressed to the undersigned and endorsed "Proposal for Brooks Aqueduct," will be received up to noon of **May 1st, 1912.**

The site of the work is about four miles southeast of Brooks, Alberta, a station on the main line of the Canadian Pacific Railway, 125 miles east of Calgary. The aqueduct is about 10,000 feet long and 54 feet maximum height, and is designed to discharge 910 cubic feet per second.

Tenders will be received based either on the design prepared by the Company's Engineer or on designs to be submitted by the bidder. The Engineer's design involves the furnishing and placing of about 23,400 cubic yards of concrete and 3,640,000 pounds of reinforcing steel, together with excavation and filling to the amount of 40,000 cubic yards.

All labor and materials required will be at the expense of the Contractor.

Bidders will be required, either personally or by representative, to visit and inspect the site and satisfy themselves as to local conditions, supply of material, etc.

Plans, specifications and full information may be obtained on application to A. S. Dawson, Chief Engineer, Calgary.

A deposit of $300 will be required before plans or specifications will be given out, which will be returned on receipt of the same in good condition.

All proposals must be accompanied by a certified cheque payable to A. S. Dawson, for five per cent. of the amount of the tender, to be forfeited as liquidated damages in case the bidder neglects or refuses to enter into a contract should the work be awarded to him.

Proposals will not be considered unless made on the form provided. Interlineations, alterations or qualification prices, except as therein provided for, may invalidate porposals.

The Company reserves the right to reject any or all tenders and to waive defects.

A. S. DAWSON,
Chief Engineer,
Department of Natural Resources,
Canadian Pacific Railway.
Calgary, Alberta, March 1, 1912. 6 13 20

Town Foreman Wanted

Applications for the position of Town Foreman, addressed to Jos. McCartney, Town Clerk, and marked "Application for Foreman" will be received by the Corporation of Galt, up to twelve o'clock noon, February 28th, 1912.

Foreman's duties to include the Inspection of Buildings and Plumbing.

Applicants to state qualifications and give references where possible, as to ability to handle Road work, Sewers, Sidewalks, etc.

The initial salary for the position will be $1,400. No application necessarily accepted.

EDWARD O. FUCE,
8 Town Engineer.

Plant For Sale

One No. 4 stone crusher, jaw; capacity, 10 tons per hour.

One 30 horse power upright boiler.

One 30 horse power Leonard Clipper engine.

One 12-ton road roller.

The entire plant has only been used one season, in all about four months, and is in first-class condition and ready to go to work as soon as fittings could be placed. Immediate delivery, as the plant has not been working since last August. For full particulars and terms apply to

R. E. GILLESPIE,
McGill College Avenue,
Montreal, Que.

Tenders Wanted

Pumping Engine

Sealed tenders addressed to T. W. Brooke, Esq., Chairman, Water Commissioners, Windsor, Ont., and marked "Tender for Pumping Engine," will be received by the undersigned up to 12 o'clock noon, on **Monday, the 19th day of March, 1912.**

Proposal No. 1.

For the building and installing of one Horizontal Cross Compound, High Duty Crank, and Fly-Wheel Condensing Pumping Engine, having a capacity of five million Imperial gallons in 24 hours against a domestic pressure of 50 lbs. per square inch, or a fire pressure of 110 lbs. per sq. inch, with 100 lbs. steam at throttle.

Proposal No. 2.

For the building and erection of a Pump, having a capacity of eight million Imperial gallons in 24 hours, under similar conditions and specifications as contained in Proposal No. 1.

Each tenderer will furnish his own plans and specifications.

Time required to complete the work, including installing, must be stated in the tender. A certified cheque payable to the order of the Water Commissioners equal to 10 per cent. of the amount of tender must accompany each tender, which cheque in the case of an unsuccessful tenderer will be forthwith returned, but in the case of the successful tenderer will be retained until a satisfactory bond for the due performance of the work is executed, or if such successful tenderer for any reason neglects or refuses to execute a satisfactory bond within 15 days after his tender is accepted by the Water Commissioners, said cheque will be cashed and the expense of re-advertising the work required and any additional cost of building and installing said Pumping Engine over the amount of his tender will be retained from the proceeds of such cheque.

The right is reserved to reject any or all tenders.

THE WATER COMMISSIONERS,
W. A. Hanrahan, Secretary.
Windsor, Ont., Feb. 15, 1912. 8 10

Business Buildings and Industrial Plants

(Continued from page 67)

Paint Company, Walkerville, Ont. Architects, Stahl & Knisey, Walkerville. General contractors, De Lisle, Frost, Winchester Company, Detroit, Mich. 5 storeys, 50 x 50, fireproof construction, electric lighting, steam heating, prepared roofing, freight elevators, factory machinery, motors, telephones. Architect asking bids on painting, glazing, plumbing, heating and roofing. Building expected to be roofed about March 1st.

Power Plants, Electricity and Telephones

Brockville, Ont.

The Brockville Light & Power Commission contemplate the purchase of a new gas producer unit. Chairman, H. A. Stewart, K.C., Brockville.

Calgary, Alta.

Work is in progress for gas mains (208 miles, from Bow Island), for Canadian Western Natural Gas, Heat & Power Company, Calgary. J. J. Corcoran, of J. J. Corcoran Co., is in Calgary trying to land contracts for trenching. This company has laid 65 per cent. of gas mains in United States.

Tenders are called for electric machinery. City Clerk, J. M. Miller. One 2,500 kw. turbo generator; one 1,000 kw. synchronous motor generator; one 50 kw. motor-driven exciter, one 25 kw. motor-driven exciter, all delivered and erected in Calgary. Copies of specifications at the office of the British Trade Commissioner, Montreal, or 73 Bashinghall street, London, E.C. Received by commissioners until noon, March 15th.

Details of expenditure for extension of city light and power system; City Clerk, J. M. Miller. Electric light—400 additional street lamps, wire and labor, $40,000; transformers for light and power, $20,000; meters, $18,000; cross arms, $2,000; poles, $10,000; hardware, $5,000; labor on overhead construction, $40,000; new sub-station on 9th avenue west and equipment, $20,000; underground lead covered cable (feeders) and labor, $30,000; sundry accounts, $15,000. Power plant.—Exciter for 1,000 kw. railway motor generator, $1,000; water tube boilers, 350 h.p. each, $32,000; bricking in boilers, $2,000; mechanical chain grate stokers, $8,000; 2,500 kw. steam turbo-generator, complete, $65,000; 1,000 kw. railway motor generator,complete, $25,000; exciter set for 300 kw. motor generator, $800; feed water heater, closed tppe feed pumps, $4,000; boiler and feed piping, $2,500; auxiliary piping, $2,000; foundations for turbine motor generator, feed pumps, feed water heater, etc., $2,500; 5,000,000 gallon motor driven pump, $5,000; extension to power house sewer, $2,000; sundry extensions, $15,000.

London, Ont.

Plans will be prepared for addition to power plant for London Street Railway Co. Manager, C. B. King. New power house, new 500 h.p. steam engine and electrical apparatus. Negotiations for supply of Niagara power were unsuccessful. Work to commence as soon as possible.

Niagara Falls, Ont.

City of Niagara Falls, Chairman Electric Light Committee, Wm. Ward, has authorized the purchase of supply of meters, insulators anl wire required for this year, also vault doors.

Stratford, Ont.

F. C. Whatmough, electrical contractor, has been awarded the contracts for installing electric wiring and fixtures in the Windsor Hotel and also the offices of the British Mortgage & Loan Co.

Walkerton, Ont.

The Walkerton Electric Light & Power Company, Engineer, H. Robertson, propose the installation of hydro-electric development, 400 h.p. turbine and generator and equipment, wiring, poles, motors for factories and electric lighting of town.

Winnipeg, Man.

Tenders are called for fire and police telegraph systems. Aerial and underground cables for fire alarm and police telegraph system. Received by Board of Control until 11 a.m., March 25th.

Miscellaneous

Granby, Que.

Thos. Belair, 1835a Rue Ontario, Montreal, Que., has been awarded contract for two steel towers to carry 30,000 gallon and 50,000 gallon tanks for the Imperial Tobacco Company.

Sydney, N.S.

The following fire-fighting equipment is to be included in the March estimates: (1) Combination chemical and ladder auto truck; (2) combination chemical and ladder horse drawn truck. Auto truck to have two 40-gal. tanks, one 25 and two 16-ft. ladders and equipment. Horse truck to have two 30-gal. tanks and one 25-ft. and two 16-ft. ladders and equipment.

Toronto, Ont.

Tenders will be received by Mayor Geary until February 27th, for supply of asphalt for 1912. Specifications at office of City Engineer, C. H. Rust.

Business Notes

Glace Bay, N.S.

St. Paul's Presbyterian Church; Pastor, Rev. D. M. Gillis, Glace Bay. Building damaged to the extent of $10,000 by fire. Three large pipes damaged in organ supplied by Cassavant, St Hyacinthe, Que.

Iroquois, Ont.

Methodist Church has been destroyed by fire, loss $25,000. Pastor, Rev. Geo. C. Poyser, Iroquois. The building will have to be entirely rebuilt.

Montreal, Que.

J. W. Hughes, plumbing shop, 367 Craig street, burned on February 13th. Walls still standing; loss $6,000.

Moose Jaw, Sask.

Warehouse of Duncan & Slattery, Moose Jaw, has been completely destroyed by fire; loss $7,000.

The Empress hotel, owned by Harry Meade, damaged by fire to extent of $80,000.

Newboro, Ont.

Fire destroyed Newboro Presbyterian Church. Pastor, Rev. Dr. W. A. McKenzie, Westport. Building was of brick construction and totally destroyed. Loss $13,000.

Ottawa, Ont.

Residence at 59 McLaren street, belonging to R. T. Holcomb, has been totally destroyed by fire; loss $7,000.

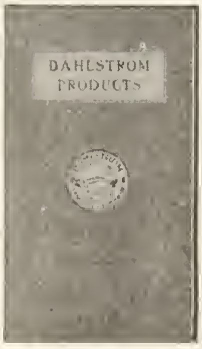
China and crockery warehouse of Parson & Co., 159 Bank street, was completely destroyed by fire on 9th inst.

Owen Sound, Ont.

Fence works of Owen Sound Wire Fence Co. and machinery badly damaged. Repairs to be made immediately. Loss is about $20,000.

Weston, Ont.

The town of Weston has for sale electric light machinery; 50 h.p. engine, boiler, dynamo, etc. See also "Tenders & For Sale Dept." of this issue. J. H. Taylor, secretary Weston Power & Light Commission.


The Dahlstrom Products

A little booklet explaining many interesting features concerning the origination and perfecting of "steel interiors." It is agreed by authorities and proven by many actual and severe tests that no matter what precautions you take to fireproof a building, the structure is not nor cannot be "fireproof in reality" if inflammable trim is used, which permits the fire to spread from room to room and floor to floor.

Get a copy of this booklet. The information contained therein is both interesting and valuable. It is a concise story of The Dahlstrom Products and What They Are. Free for the asking.

Dahlstrom Metallic Door Co.

The Dahlstrom Products

Executive Offices and Factories: 18 Blackstone Ave., JAMESTOWN, NEW YORK.
Branch Offices in All Principal Cities.

Tenders

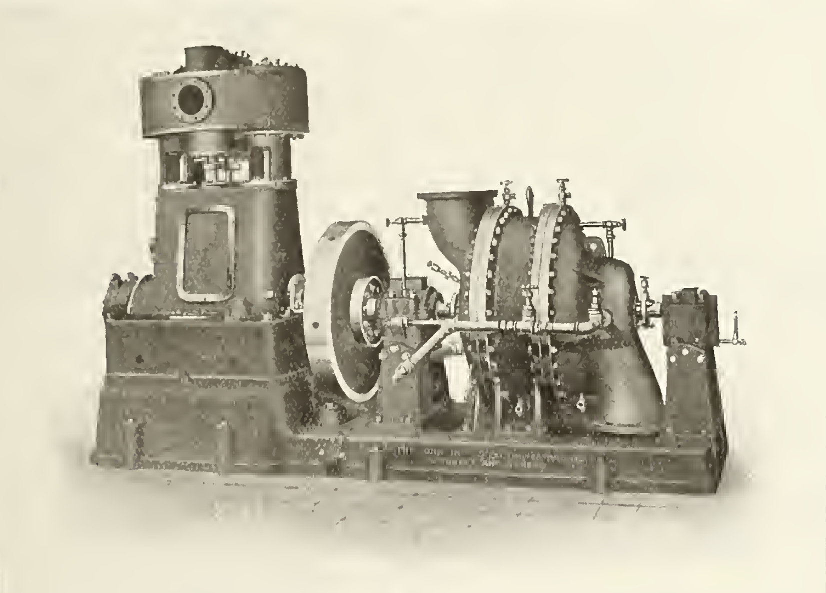
A few dollars spent in advertising your proposals in

The Contract Record

would result in additional competition, which might save your city or town or your client many hundreds of dollars.

Motor and Steam Driven Pumps

FOR TOWNS AND CITIES



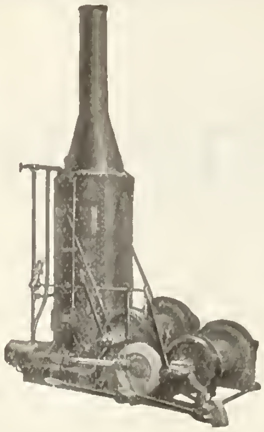
6,000,000 Imperial Gallons per 24 hrs. 80 ft. head 475 R. P. M. Steam driven pump for city of Edmonton, Alberta,

"Inglis" Pumps give satisfactory results, because they represent the best in Engineering skill, workmanship, and design.

We manufacture Motor and Engine driven Turbine pumps to meet any requirement.

WRITE US FOR PROMPT INFORMATION.

The John Inglis Company
Engineers and Boilermakers Limited
14 Strachan Ave., TORONTO, Canada



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It's a beauty, and the largest and best catalog of

Hoisting Machinery

ever published in Canada.

And why should it not be the Best Catalog, for does it not describe the Best Hoisting Machinery made in Canada?

This book also shows a splendid assortment of Derricks and Derrick Parts, Steel Buckets, Steel Skips and Steel Cars, and many other articles used in connection with Hoisting Machinery.

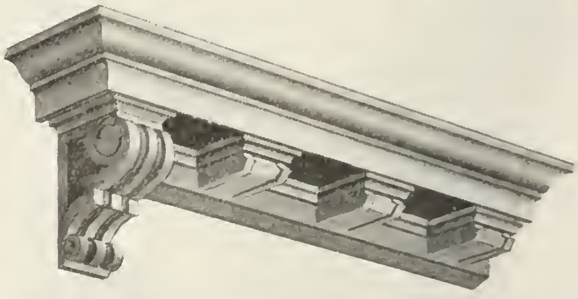
If you are interested in these goods drop us a line, so we may mail you one of these fine catalogues. You will not be sorry.

Marsh & Henthorn, Limited
Belleville, Ont.
Makers of Hoisting Machinery
Sales Agents: MUSSENS Limited, Montreal

WRITE FOR OUR

Galvanized Cornice

CATALOGUE

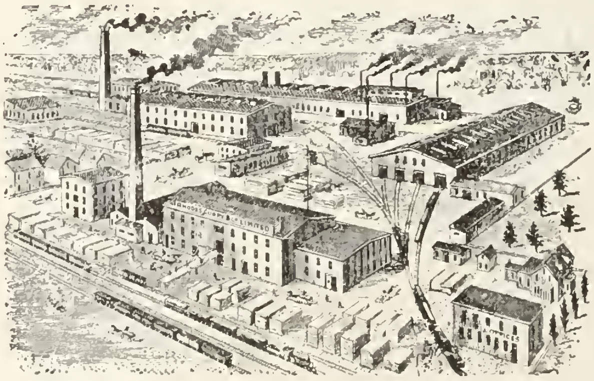


We illustrate scores of designs from which to choose or which will give you suggestions from which to design your own cornice.

Catalogue or special designs executed promptly by thoroughly competent workmen.

The Metallic Roofing Co.
LIMITED
Manufacturers
TORONTO, ONT. WINNIPEG, MAN.
(46)

Rhodes, Curry Co., Limited
Lessees



Bank and Office Fittings

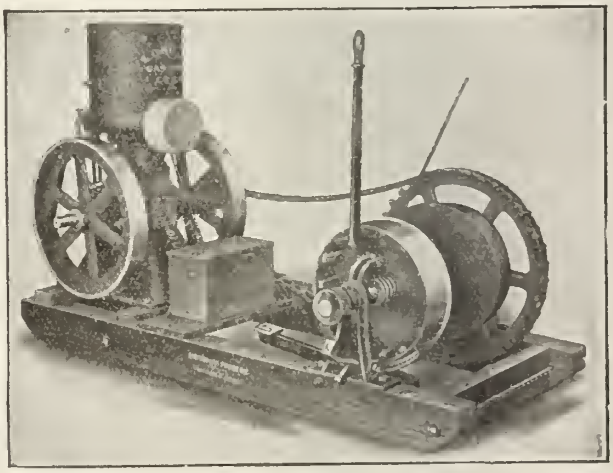
SCHOOL DESKS A SPECIALTY

We manufacture all kinds of building materials, including cast iron columns, cresting, sash weights, etc.

In addition to our large stock of native lumber, we are now carrying about one million feet of foreign lumber, including oak, walnut, ebony, whitewood, basswood, red cedar, Douglas fir, mahogany, &c.

Rhodes, Curry Co., Ltd. Amherst, N. S.
BRANCHES AT
Halifax Sydney

Do You Want a Good Hoist?



PATENT APPLIED FOR

"London" Friction Clutch Hoist

Here are a few of its many uses

Contractor's Work
Bridge Building
Mortar Conveying
Sewer Building
Well Digging
Pile Driving

This hoist can be used with any make or style of gas, gasoline or oil engine

The London Gas Power Co., Limited
Engineers and Machinists London, Canada

TURBINE PUMPS

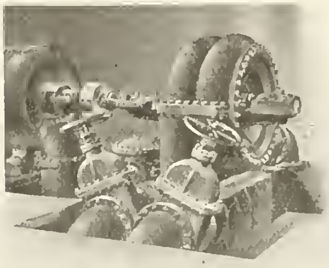
for Water Works Purposes

In Water Works practice it is necessary to provide for two pressures, one domestic and the other higher for fire service. For this purpose we offer our

Patented Double Suction

By an ingenious application of the double suction it is practicable to operate the same pump at either fire or domestic pressure and yet maintain a constant speed. The recent addition to the waterworks at Lachine shows how this end is attained.

The unit consists of a 11-inch 2-stage turbine pump of capacity of 5,000,000 Imperial gallons per 24 hours driven by either a 400 horse power motor or a 400 horse power steam turbine at 1,200 r.p.m. For ordinary domestic purposes a pressure of 80 lbs. is sufficient and this is obtained by closing one valve and therefore operating one stage of the pump, changing it in fact to a single stage pump. For fire service both stages are used and a pressure of 110 lbs. can be maintained. The speed, however, remains the same for both services. The exclusive rights to this double suction for Canada are owned by



Patented Double Suction

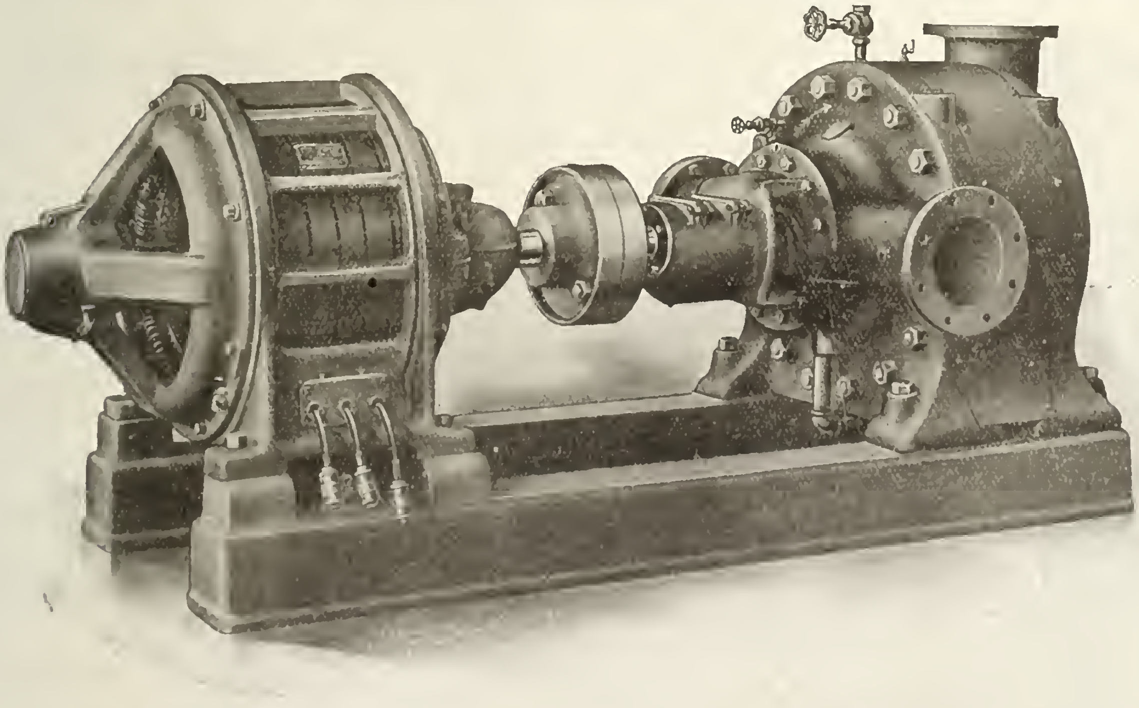
THE JOHN McDOUGALL CALEDONIAN IRON WORKS CO.

LIMITED

WORKS: **512 WILLIAM STREET, MONTREAL**

Sales Offices: **MONTREAL TORONTO COBALT WINNIPEG CALGARY VANCOUVER**

Electrically Operated Turbine Pumps for All Duties

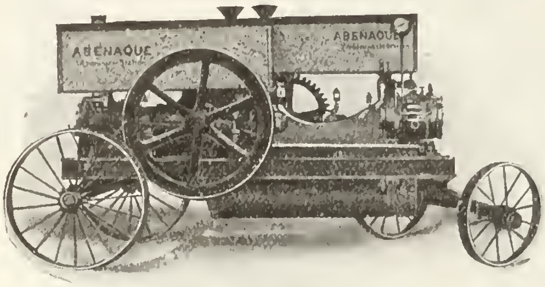


CANADA FOUNDRY COMPANY, Limited

TORONTO MONTREAL HALIFAX OTTAWA COBALT WINNIPEG CALGARY VANCOUVER NELSON

YOU CAN SAVE $ ON EVERY JOB

Embodying Rock Excavation



ABENAQUE

Portable Compressor Outfit

costs but $12.00 per day to operate and saves the labor of 30 men. It is a money saver for every contractor using it. Let us show you where you can save money on your contract. **Write for Catalogue "M".**

Abenaque Machine Works
Westminster Station, Vt.

FOR SALE

Detroit River Tunnel Equipment Air Plant

Consisting of Compressors, Hydraulic Pumps, Cylinder Jacks, Hydraulic Pipe, Man Air Locks, Valves and Fittings of every description.

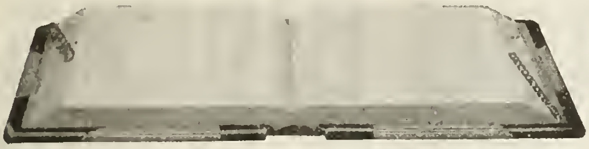
M. MITSHKUN CO.
P.O. Box 806
DETROIT, MICH.

The Tiffin Wagon Company, Tiffin, Ohio

TIFFIN FLUSHER. STREET SCENE PEORIA, ILL.

- Street Flushing Machines
- Sprinkling Wagons
- Dumping Wagons
- Municipal Vehicles
- Steel Dumping Carts
- Contractors' Carts
- Garbage and Street Cleaning Carts

"PROUDFIT" BINDERS



Absolutely flat opening, gives blank book convenience with loose leaf utility. No metal parts exposed. Easy to operate. Guide bands made of especially tempered steel, will not break, cannot crack or become rough.

"Proudfit" Binders pay for themselves in time saved alone.

Business Systems Limited, 52 Spadina Ave. TORONTO Ontario.

Engines and Boilers

of all types and sizes, Heaters, Tanks, Pumps, etc.

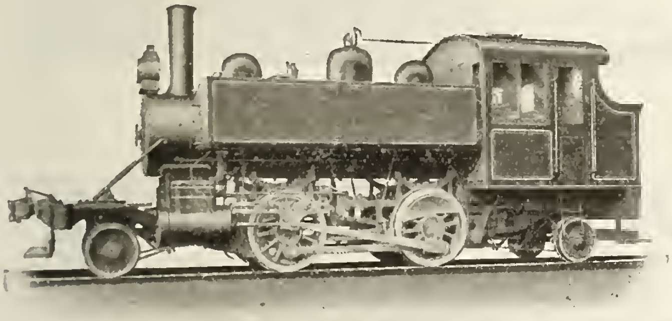
E. Leonard & Sons LONDON ONT.

AGENTS:

MONTREAL ST. JOHN, N. B. WINNIPEG CALGARY VANCOUVER

Agents for
National Gas Engine Co.
Browett-Lindley Vertical Engines

INDUSTRIAL LOCOMOTIVES



It is important for you to know what a locomotive will do to justify its cost.

It must pull the required load, start it and keep it going.

It must provide just the right amount of the right material in the right place.

Each and every part must be sure to fit not only the locomotive of which it is a part, but every other locomotive of the same size and design. Every operation must be made in fixtures or to templets compelling accuracy of manufacture so that the machine will not be idle at a critical time for necessary repairs or renewals. Spare parts must be instantly available, made so well as to go into place without a machine shop.

Visit our works and see how all this is accomplished.

MONTREAL LOCOMOTIVE WORKS, LIMITED

BANK OF OTTAWA BUILDING, MONTREAL, CANADA

Cumberland County Quarries

Red and Grey Freestone

Oakley Myers, Amherst, N.S.

Hardens with Age. Low Price. Samples and Quotations Free

Crushed Stone, Limited

STONE of any Size and in any Quantity on hand for Sidewalks, Roadwork or Concrete Work

Works :
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Phone Main 4516

Head Office :
47 Yonge St. Arcade, TORONTO
G. W. ESSERY, Manager

Steel and Wood **TANKS**

Suitable for Sprinkler Systems Fire Protection, Water Supply Plants, etc.

Steel Substructures of all kinds
(Galvanized or Painted)

Windmills, Gasoline Engines, Hydraulic Rams, Etc.

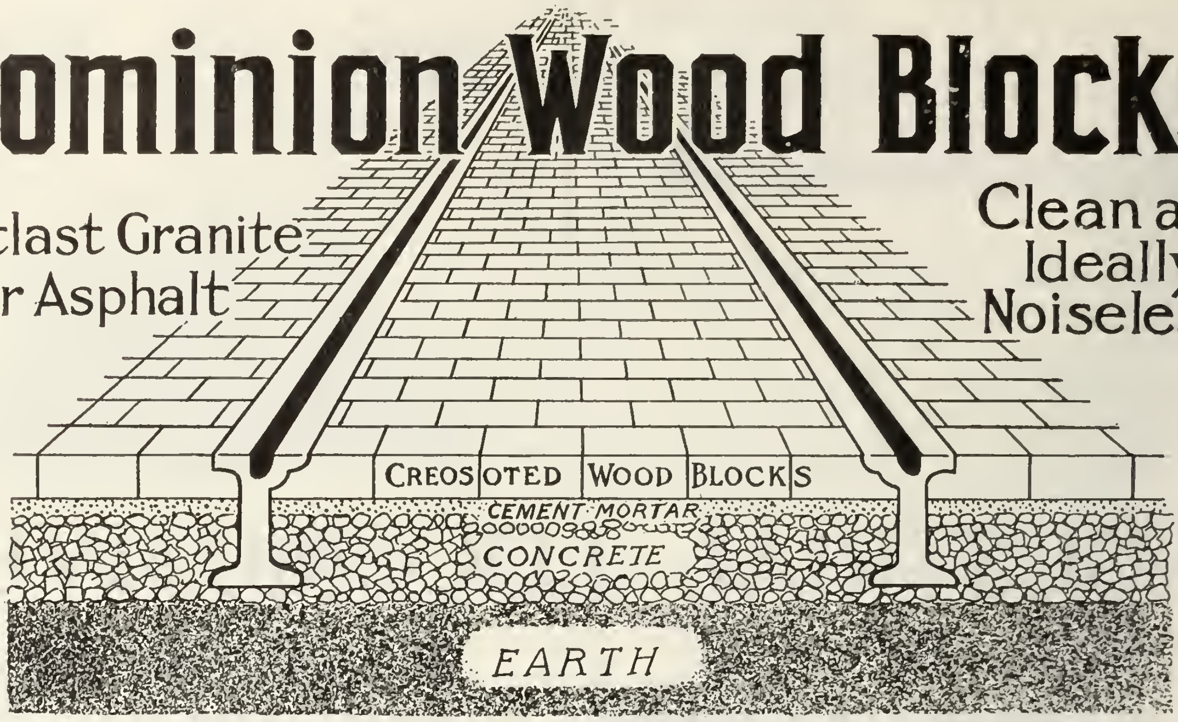
Ontario Wind Engine & Pump Co.
Limited

TORONTO WINNIPEG CALGARY

Dominion Wood Blocks

Outlast Granite
or Asphalt

Clean and
Ideally
Noiseless



The Proof of the Pudding

May be in the eating; which seems also to suggest ease of early dissolution. The exact reverse applies to the PROOF OF A

Permanent Pavement

One that requires the constant attention of the Repair Gang to prevent its break-up and ruin could not be said to have proven satisfactory. Yet the Repair Gang seems to be an essential feature of Patent Pavements. ¶ How often have you seen the **Creosoted Wood Blocks, The Wood Eternal,** being PROVED IN THE PUDDING MANNER? ¶ Dominion Creosoted Wood Paving Blocks are cut from the log of live Douglas Fir in our own mills.

Dominion Creosoting Company

BOX 143

Vancouver B.C.

LIMITED.

The Mullen Combination Tar Kettle and Gravel Heater

A Money Maker for Contractors

Is on wheels and can be easily moved about. Supplies hot gravel and hot tar from the one fire.

Write us for particulars

Tide Water Iron Works
HOBOKEN, N. J., U. S. A.

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Limited

Builders' Supplies

Head Office:
510 Crown Life Building, Queen and Victoria Streets

Phones: Main 5472-5473
Evening, Parkdale 2583

Grey Lime
White Lime
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Portland Cement
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Waterproofing Cement
Fire Brick
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Sackett's Plaster Board
Parker's Corner Bead
Plaster Paris
Plasterers' Hair
Iron Staunchions
Mortar Colors
Weeping Tile
Sewer Pipe

We can make immediate delivery of any of the above materials from any one of our branch yards. Would be pleased to have your order.

"Hammer Brand"
Hard Wall Plaster

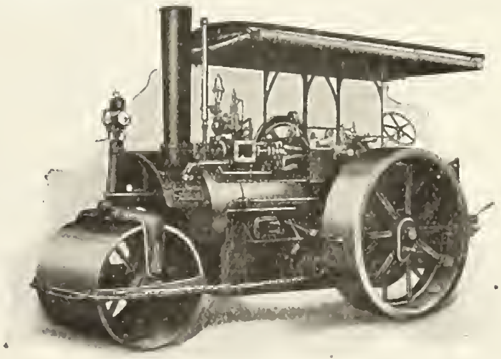
HARD-WALL PLASTER HAMMER BRAND HILLSBOROUGH, N.B.

It neither loosens nor falls off, it allows carpenters to follow plasterers without loss of time and lasts as long as the building.

Albert Manufacturing Co.
Hillsborough, New Brunswick, Canada

Works Destroyed by Fire
— Now Rebuilding

"A Canadian Roller for Canadian Roads"

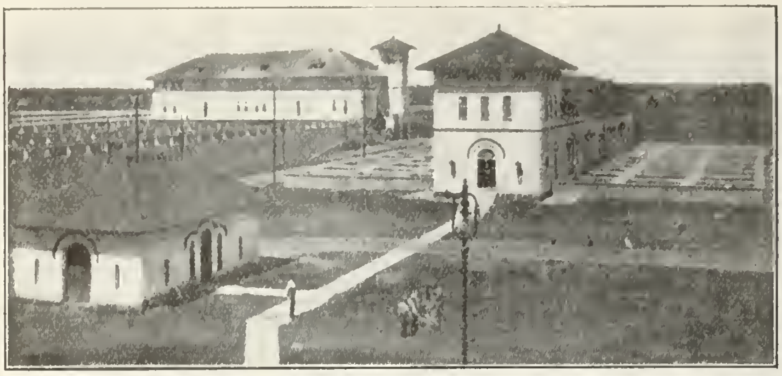


THE WATEROUS
DOUBLE CYLINDER
STEAM ROLLER

is built essentially to suit Canadian road building conditions. Over 100 Rollers in use in Canada to-day are proving their ability as road makers of the highest quality. A greater rolling capacity, with less cost of maintenance and operation, are its distinguishing characteristics. *Bulletin No. 101*

The Waterous Engine Works Co. Limited
BRANTFORD, CANADA

Agent:—Hugh Cameron & Co., 72 Queen St. E., Toronto, Ont.



Orleans Filtration Plant and Concrete Building taking about 100,000 barrels of Alsen's New Cement

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
45 BROADWAY, NEW YORK

ANOTHER TEST

Put on a wall two sheets of lath, one the ordinary kind and one of Herringbone. Mix your plaster too wet and without sufficient hair. By varying your mix you will easily find a plaster which will drop badly from the back of the ordinary lath but will not drop from the Herringbone.

Herringbone Lath gives the best key

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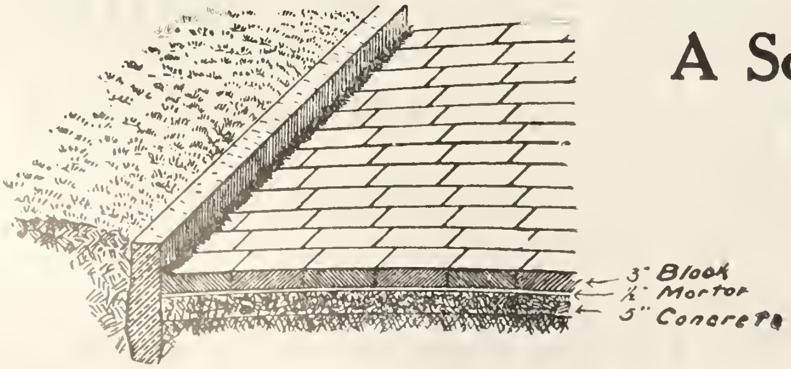

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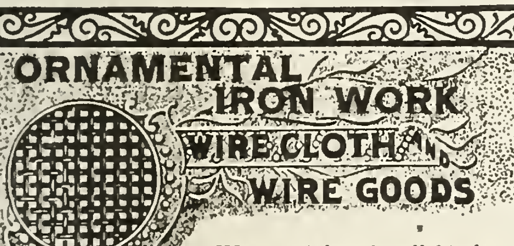

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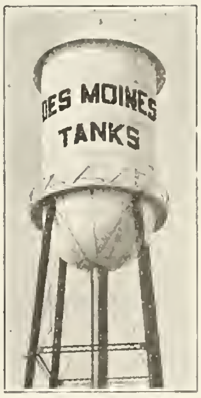

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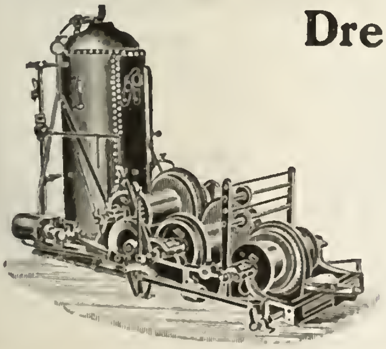

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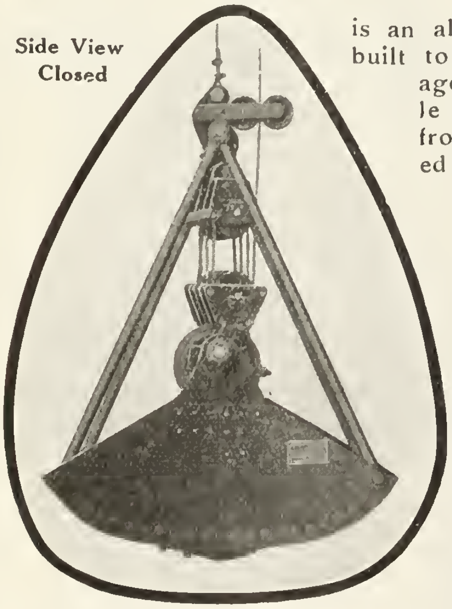

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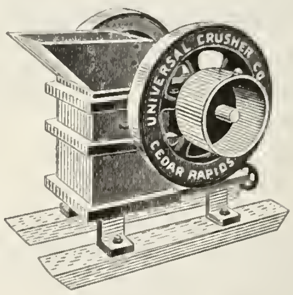

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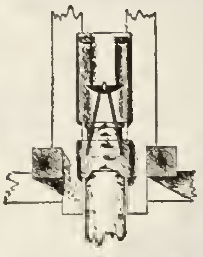
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Perfect Head Block

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will be visitors at the International Clay Products Exposition in the Coliseum, Chicago, March 7th to 12th. The visitors to this exhibition will include many of the practical and most active engineers, builders, contractors and men who have to do with city building and city sanitation.

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It is to be a practical show, given for practical men by practical men.

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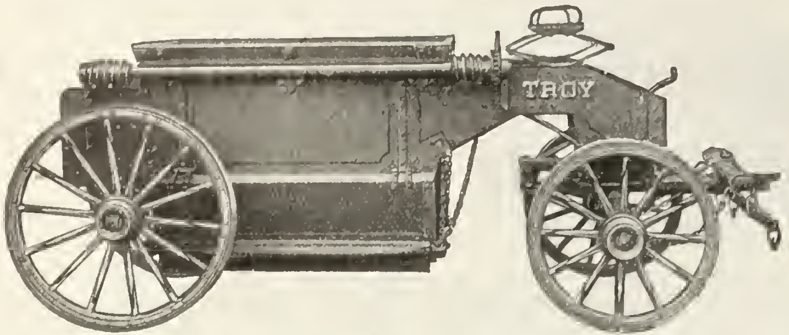

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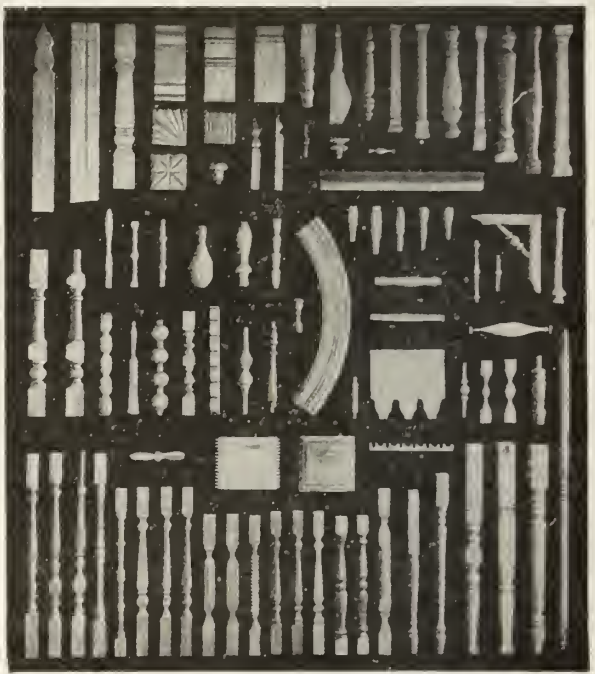

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In the end a Browning Crane will cost you less than ordinary labor and will have accomplished more.

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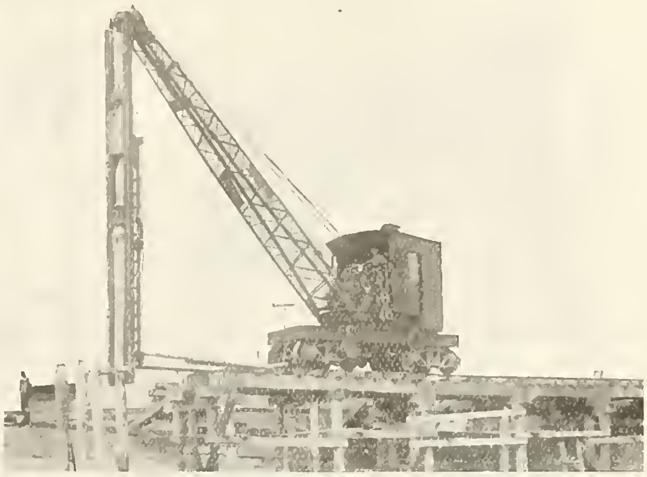

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The contractor himself made this device for driving piles with the crane. It was used on the N. Y., C. & St. L. R. R. The piles were 40 ft. long and driven 20 ft.

This is only one of the many uses of a Brownhoist locomotive crane on construction work. It is being used today for excavating, depositing concrete, handling sand, gravel, stone and heavy construction work, and switching the cars.

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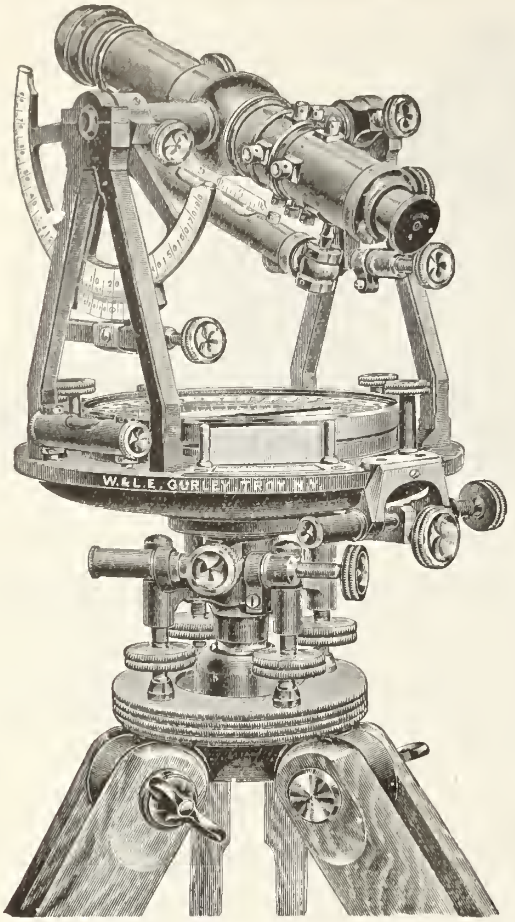

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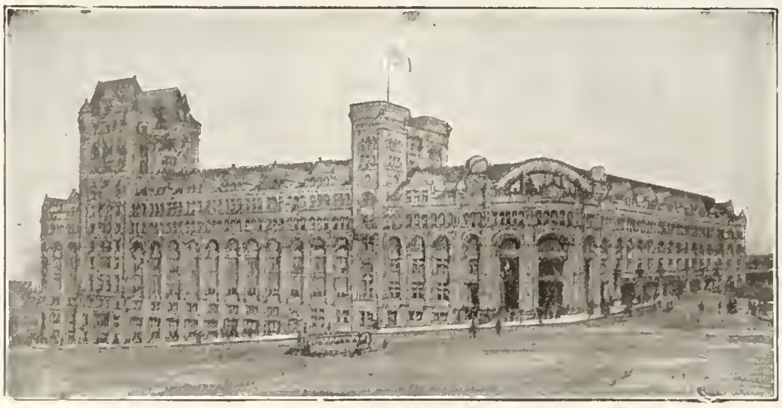
Some Architects and Engineers Think Waterproofing Concrete Is an Extravagance



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We claim that every job of concrete construction where the concrete is exposed to water penetration should be thoroughly waterproofed. Ordinary concrete is so porous that water will penetrate it. In freezing weather this water freezes and swells the mass; cracking it in spots and weakening its strength as a structural material. Repairing such weakness is often impossible. It is therefore of vital importance that the concrete be protected from these conditions by a thorough waterproofing while the structure is in course of building.

"*Ceresit*" *Waterproofing*

is an integral waterproofing that is incorporated in the whole concrete mass, permeating every part of the concrete and rendering it uniformly and permanently water and dampproof and protecting it from disintegration by freezing. Ceresit is a cream white paste which is put into the water intended to be used in mixing the cement, sand and stone. The Ceresit being held in suspension in the water is distributed uniformly throughout the mass during the mixing process.

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Our guarantee—We will put up a bond that Cresit will waterproof any kind of a concrete or cement mortar job in a satisfactory manner, when done under our direction.

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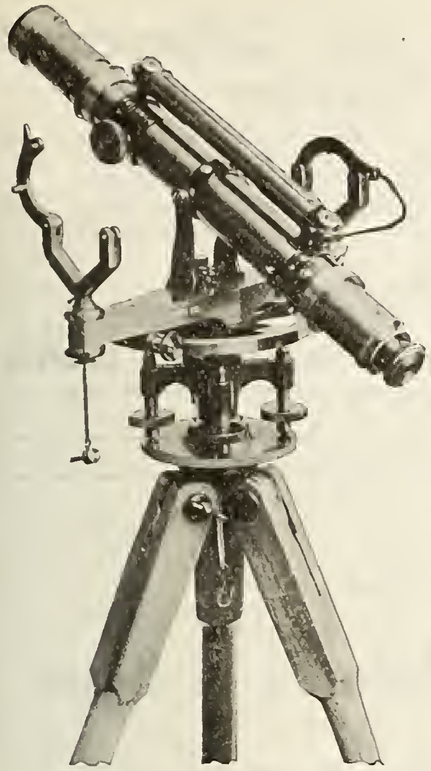

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	Per B
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No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

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Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.50	$ 6.75	$ 5.25
40 u. i.	4.25	3.75	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts—Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 per cent.

No. 4 compression bath cock .... net $1.75

No. 4½ Fuller's .... net $2.35

Square head brass cocks, 65; iron, 65 per cent.

Boilers—Galvanized Iron Range

30-gallon, standard, $4.50; extra heavy, $7.00.

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16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)	Black.		Galvanized
¼ inch	1.80	¼ inch	2.57
⅜ "	1.80	⅜ "	2.57
½ "	2.35	½ "	3.23
¾ "	2.75	¾ "	3.83
1 "	3.93	1 "	5.48
1¼ "	5.35	1¼ "	7.49
1½ "	6.44	1½ "	8.98
2 "	8.05	2 "	11.46
2½ "	12.85	2½ "	18.30
3 "	16.86	3 "	24.03
3½ "	22.57	3½ "	33.65
4 "	25.65	4 "	35.90

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-nch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

Crushed stone, 2-inch, $1.30; 1-inch, $1.30; ⅜-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and leads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $3.00.

Manilla Rope, best, per pound, 16½ cents.

PAINTS AND OILS

(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $6.75 to $7.00 per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, 99c. per gallon of 9 lbs.

Raw Linseed Oil, in barrels, 96c. per gallon of 9 lbs.

Turpentine, in barrels, 73c. per gallon.

Pure Red Lead, dry, $5.50 to $6.50 per 100 lbs.

Business Notes

Hamilton, Ont.

Printing and stationery plant, destroyed by fire. Owner of plant, Robert Duncan Co., president, R. A. Robertson, York and James streets. Owner of building, Mrs. McGiverin. Loss on building, $40,000; on plant, $60,000. Company will re-build without delay. Presses, printing and bindery equipment will be required.

Iberville, Que.

On the 6th inst fire destroyed the Roman Catholic Church here. Loss $250,000, partly insured.

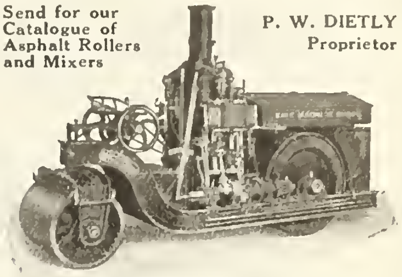
Pinkerton, Ont.

The sawmill of Campbell & Pinkerton burned. A new and larger mill will be erected requiring complete new equipment.

Windsor, Ont.

On the 6th inst. fire destroyed St. Alphonsus Separate School. Loss estimated at $25,000, Park and Pelissier sts.

ERIE MACHINE SHOPS
Send for our Catalogue of Asphalt Rollers and Mixers
P. W. DIETLY Proprietor



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1303 Peach Street, - Erie, Pa.

Cement Sidewalk Tools
Send for Our 1912 Catalog.
We manufacture and carry in stock the largest and most satisfactory line of cement sidewalk tools in Canada.
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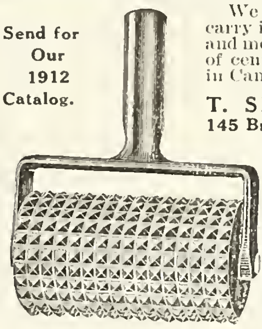
145 Brock Ave., Toronto
Representatives
A. Bremner, Montreal. Forbes & Van Horn, Vancouver. H.S.Howland, Sons & Co., Toronto. Winnipeg Tool & Forging Co., Winnipeg. J. H. Ashdown, Ltd., Winnipeg. 6



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Locomotive cranes, clam shell buckets, hoisting engines, steam shovel, pile driver, steam hammer, diving suits, stiff leg derricks, turnover buckets, two (2) marine engines, boilers, fuel lighter with whirley aboard. Address
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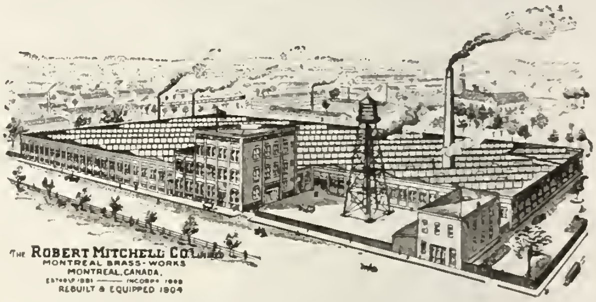

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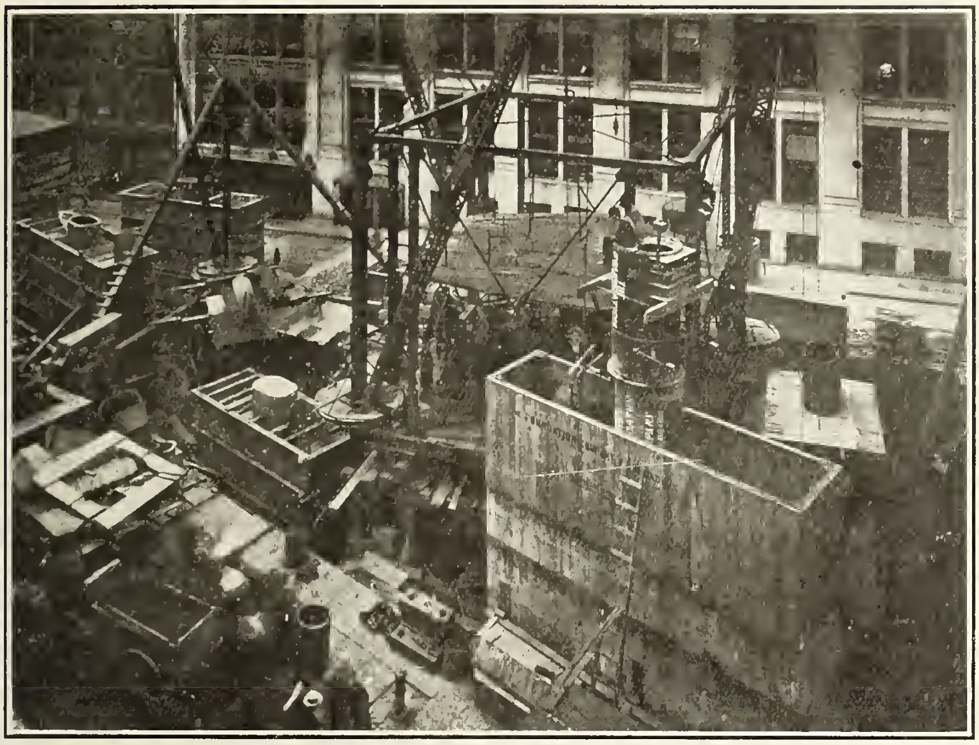

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Specifications are invited from Architects and Engineers.

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We will be pleased to tender
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to pass us by before getting our prices on your requirements or before putting in your tenders on

Plate Sheet Fancy

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Glazing Glass

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Consolidated Plate Glass Co.

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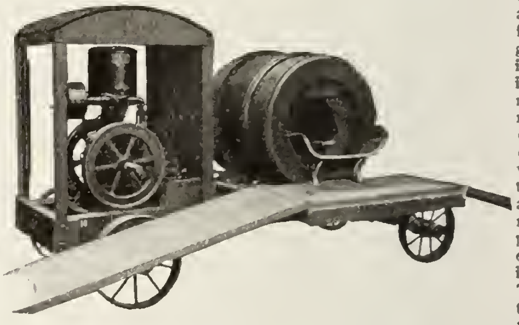
To Any One Who Will Investigate

There is a fact that compels Conviction That The Eclipse Low Charging Concrete Mixer

SAVES MONEY

Saves in the first cost of the machine, saves in power, saves in fuel, saves in manual labor, saves in attendance of the machine, saves in portability, saves in delays, and saves in repairs.

Figure all of this saving and the aggregate saving is so important that the greater economy must be evident to you.



First of all it charges only about 2 feet from the ground. There is no charging elevator required, no mechanism to operate a charging elevator, no extra man to attend it and no additional power required to operate it.

There is only the simple mixing drum direct connected to the power required to operate it, so simple, so compact and so portable that the workmen can move the mixer to any location on the job in a moment's time. And the large, open drum removes all guess work from the mixing. You can see the entire batch when mixing.

Catalog No. 45 describes it. Shall we send the catalog.

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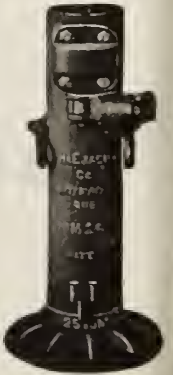

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He can do as much work in eight hours as two high priced drill runners and two "chuckers" can do with 2-3 1/8″ Standard Reciprocating Rock Drills and the CLASS "B" ONLY USES 65 cu. ft. OF AIR PER MINUTE AGAINST 135 cu. ft. per minute for each of the 3 1/8″ old style drills.

This little Class "B" will "down" holes, either wet or dry, from 6 to 8 ft. deep.

THE VERY THING FOR SHAFT SINKING

Its PRICE is LOW. Its EFFICIENCY HIGH. We carry them in stock.

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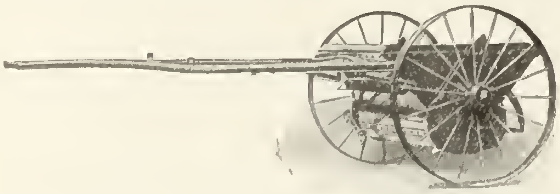

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The load is under perfect control at all times.

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Our Equipment is Manufactured in Canada for Canadian Trade

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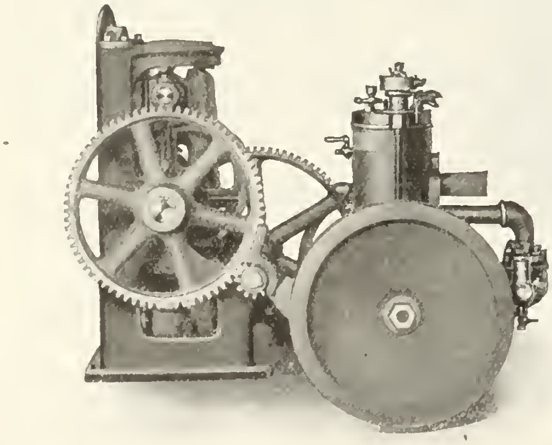

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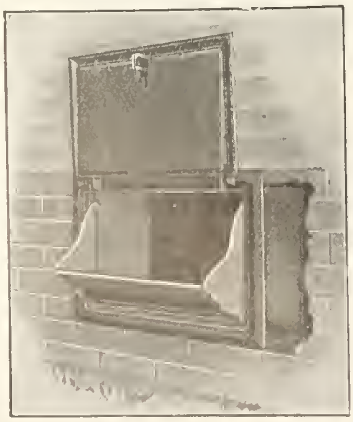

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with one of our "Majestic" Coal Chutes which is the neatest and best equipment for any cellar. It is easily installed in either new or old houses. It permits coal, wood or vegetables to be put into the cellar without disfiguring the building in any way. And unlike a glass window it cannot be broken. The hopper can easily be removed if desired to put in very coarse coal or wood, or if a waggon chute is used. It swings back into the chute and allows the door to be closed. The door is made to lock when opened upward, and protects the wall or siding above the chute, and can be released only when closed. We make three standard sizes. There's a size that's just right for your cellar and your requirements. No. 1—22 x 16 x 13 No. 2—27 x 16 x 13 No. 3—33 x 22 x 18

Send for our illustrated booklet, it shows and describes our full line of Coal Chutes

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Prompt Shipments Guaranteed.

The Blystone Mounted Mixer with Power

is specially designed to adapt itself to any kind of work. For all-round purposes, it is unquestionably, the most efficient mixer on the market. It contains all the features of simplicity and durability which have made our shop mixers famous in hundreds of Block, Brick and Tile plants throughout the continent.

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Here Is A Roofing That Will Never Decay

You cannot make cedar, cypress or redwood shingles water proof—weather proof—decay proof—they are short lived under the best of treatment and repair expense comes often.

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Ask for our catalogue and booklets on asbestos—learn how the shingles are made that last a life time without paint or repairs—clip the coupon and mail it **now.**

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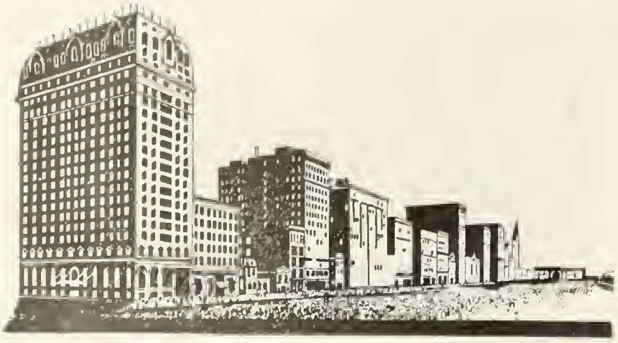

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West ahead of the East by a big margin in 1911—Toronto has safe hold on premier position.

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	1911	1910
Toronto, Ont.	$24,374,539	$21,127,783
Montreal, Que.	14.561,481	15,815,859
Winnipeg, Man..	17,550,000	15,106,480
Vancouver, B. C.	17,652,642	13,150,365
Ottawa, Ont.	2,997,610	3,022,350
Hamilton, Ont..	4,255,730	2,604,605
London, Ont.	1,036,880	805,074
Halifax, N. S.	508,796	630,380
Calgary, Alta.	12,909,478	5,589,594
St. John, N. B.	572,700	526,435
Victoria, B. C.	4,026,315	2,273,045
Regina, Sask.	5,099,340	2,351,238
Edmonton, Alta.	3,671,850	2,159,106
Kingston, Ont.	314,569	220,092
Maisonneuve, Que. ...	2,260,160	1,955,100
Peterboro, Ont.	345,372	517,958
Windsor, Ont.	739,575	392,040
Sydney, N. S.	495,642	347,554
Fort William, Ont. ...	3,078,010	2,381,125
Berlin, Ont.	358,095	347,550
Westmount, Que.	1,489,082	2,152,020
St. Thomas, Ont.	285,515	286,100
Brandon, Man.	1,043,929	982,385
Moose Jaw, Sask.	2,475,736	1,071,090
New Westminster, B.C.	1,058,400	
Saskatoon, Sask.	5,004,326	2,817,771
Port Arthur, Ont. .. .	597,705	892,681
Chatham, Ont.	233,000	....
Galt, Ont.	282,334	....
Belleville, Ont.	320,000	....
Woodstock, Ont.	143,200	82,000
Nanaimo, B. C.	152,611	....
Lethbridge, Alta.	1,033,380	2,211,310
North Vancouver, B.C.	772,468	....
St. Boniface, Man. .. .	1,140,735	861,870
Oshawa, Ont.	120,000	179,500
Strathcona, Alta.	491,403	363,470
Medicine Hat, Alta. ..	743,532	205,640
Welland, Ont.	342,808	245,942
Nelson, B. C.	166,700	163,430
	$131,886,775	$102,819.242

These figures show a gain of 28.2 per cent. over 1910. They give some idea of what we may expect this year. If you manufacture or sell anything that enters into the construction of buildings you should write to MacLean Daily Reports Limited, 220 King Street West, Toronto, and learn how they can help you help yourself. Their organization thoroughly covers the Dominion, and supplies news economically and efficiently, or present and prospective markets for the goods their subscribers sell. If requested they will gladly send specimen reports and rates and outline facilities for serving you.

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RENFREW?

If you don't, you are missing an opportunity of saving 75 cents a day on each bricklayer, and of laying 200 more bricks a day.

"Renfrew" Lime requires less time for tempering. Does not set so rapidly and allows the bricklayer to spread for more bricks.

'Renfrew' the Lime of Quality

Jamieson Lime Co.

RENFREW, ONTARIO

White Lime - Stone - Grey Lime

Brick - Drain Tile

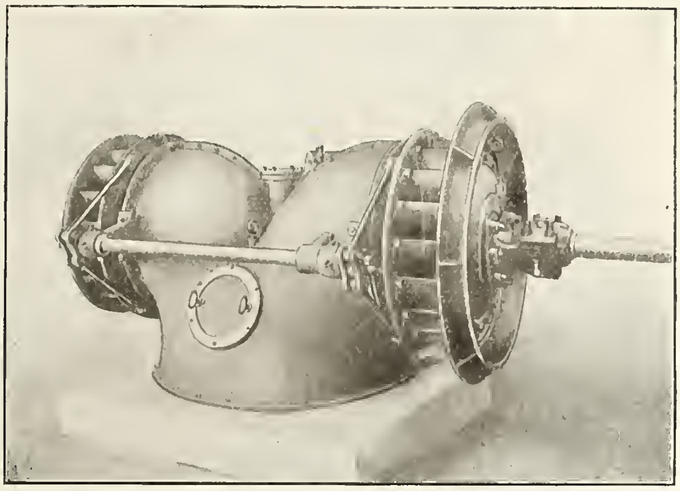
WATER-POWER

Turbines for
High and Low
Pressure

Any Output

Governors of
any Capacity

Unequalled
Design



ESCHER WYSS & CO. - ZURICH, SWITZERLAND

CANADIAN HEAD OFFICE, 408 LUMSDEN BUILDING, TORONTO

Representatives in British Columbia:
FRANK DARLING & CO., VANCOUVER

PHONE, ADELAIDE 234

A Gear That Stands Up

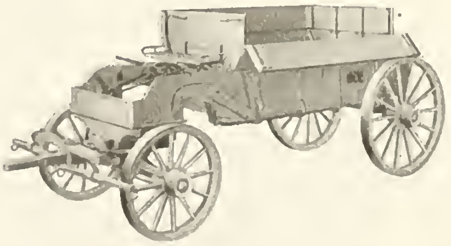
YOU don't want to experiment with anybody's front gear. The chances are too long. The Watson grading wagon gear is shown here. It's compact, solid and substantial. The strength is there—our word for that. You can have a new one free if it isn't. That's part of the year's guarantee.

The wagon is not drawn by the king bolt. It only holds the gear in place. What pulls the load is the pair of circular king-bolt plates. One fits inside the other.

Solid collar axles are used. Many dump wagons have the same size axles on both 1½ and 2 yard wagons. Not so with the Watson. Watson axles are in correct proportion to the capacity. The 2-yard wagon has heavier axles than the 1½-yard—as it should have.

Watsons to-day represent twenty-five years' experience doing one thing. That's why sales keep piling up. Maybe you would like the benefit of this experience.

Shall we send the Printed Matter?



WATSON WAGON COMPANY, Canastota, New York

THE WORLD'S LARGEST DUMPING WAGON BUILDERS

Also Offices in NEW YORK PITTSBURGH PHILADELPHIA CHICAGO

We Guarantee to Filter Though Others Fail

Where slow sand filtration or imperfect mechanical methods have failed, consult us.

"The Bell Filtration Co. accepts orders only where they can guarantee results" gains point when we state that we have never refused an order for fear of not being able to live up to our guarantees.

BELL'S Patent, Vertical, Mechanical, Pressure **FILTERS**

make 97 per cent. purification of water a practical possibility. The percentage of filtration is often higher.

Write us for our handsome free book on water

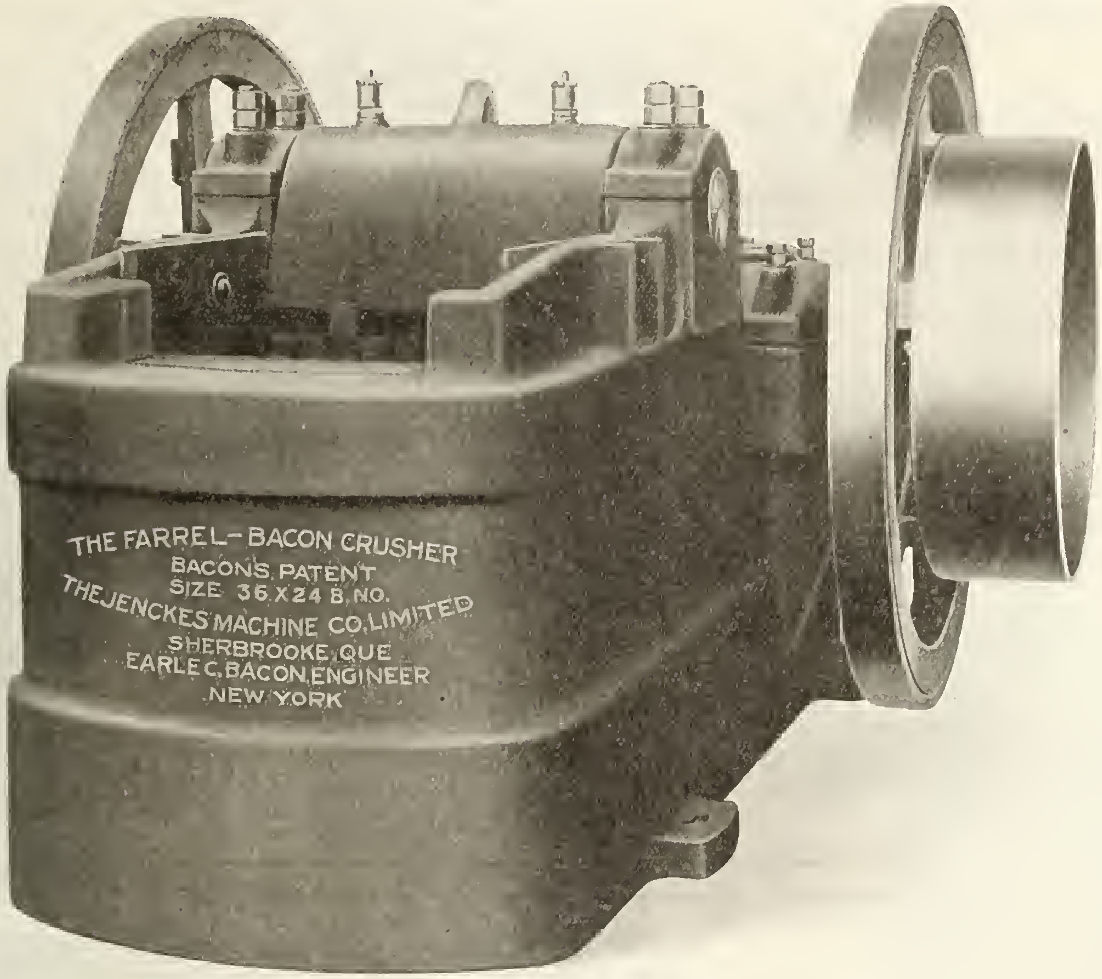
BELL FILTRATION COMPANY
OF CANADA, LIMITED
305 Kent Building, TORONTO, ONT.

TEAR OUT ALONG THIS LINE

REMINDER

to write to Bell Filtration Co., 305 Kent Building, Toronto, for free copy of their book, "Filtration and softening of Water."

THE JENCKES MACHINE COMPANY, LIMITED



THE FARREL-BACON "B" Pattern Improved

Ore and Rock Crusher

Patented

WITH DEEP FRAME

Sizes 36x24 and 36x30 inches **Numbers 15 and 15½-B**

DIMENSIONS, CAPACITY, PRICE, ETC.

No.	Size of Rec'g Capacity	Approximate Capacity in Tons, per day of 10 hours, to ANY ONE of the sizes stated				Size of Pulley	Revs. of Pulley	H. P. Required	Total Weight	Weight of Heaviest Piece	Price with Chilled Iron Jaw Plates	Price with Steel Jaw Plates
	Inches	Tons Ins.	Tons Ins.	Tons Ins.	Tons Ins.	Inches			Lbs.	Lbs.		
15-B	36 x 24	600 to 3	550 to 2½	500 to 2		48 x 20	300	75	79000	41000	$	$
15½-B	36 x 30	1200 to 6				48 x 20	300	75	80500	42200	$	$

Size No. 15-B, 36x24 inches is designed and intended for moderately fine crushing to sizes as stated.

Sizes No. 15½-B, 36x30 inches is designed for course crushing.

In ordering, or in writing for information, as to size, etc., best adapted, state kind of rock or ore tobe broken, for what purpose, and size of product required.

The capacities stated in this list are approximate, and based on a rock or ore that is hard and friable, and vary according to the nature of material to be broken; and the horse power varies somewhat also, according to the character of material to be broken, that given in table is a fair average; but it is always well to arrange for surplus power.

ALL SIZES GENERALLY IN STOCK OR PROCESS OF CONSTRUCTION

Plants: Sherbrooke, Que., St. Catharines, Ont.

This is a specimen page from our new "Crushing Machinery" Catalog. Copy on request.

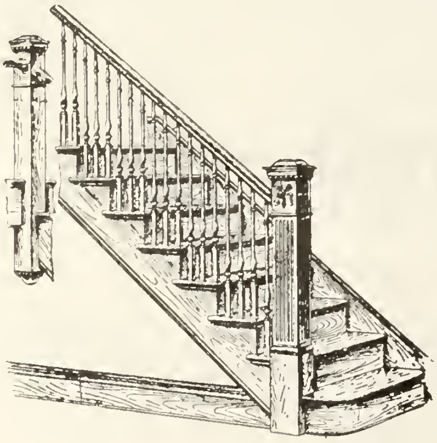
The Jenckes Machine Co. Limited, Sherbrooke, Que.
St. Catharines, Ont.

Design and Construction of this type of Building is our Specialty.

Correspondence with reference to 1912 work solicited.

Reinforced Concrete Building, for Walker Sons, Walkerville, Ont.

WELLS AND GRAY LIMITED Engineers and Contractors **TORONTO, ONT.**



We have the equipment and material to turn out stairwork that can't be excelled.

You'll find our Price is Right

BRYAN

FOR

DOORS

AND

STAIRWORK

We are manufacturers of a fine line of Pine and Hardwood finish including interior trim, interior hardwood, pine and veneered doors and stairwork.

If you are in the market for any of the above send us your plans and specifications and let us quote you.

The Bryan Manufacturing Co., Limited
COLLINGWOOD, ONTARIO

THE TEST

This illustration shows the results of an accelerated sulphuric acid test of three twenty-four gauge pieces of metal of similar size and shape.

No. 1 is "Toncan" Metal
No. 2 is Charcoal Iron
No 3 is Steel

During the test the "Toncan" metal showed a loss of 2¼ per cent; the charcoal iron showed a loss of 44 per cent. and the steel showed a loss of 86 per cent.

For Heavy Railroad Construction

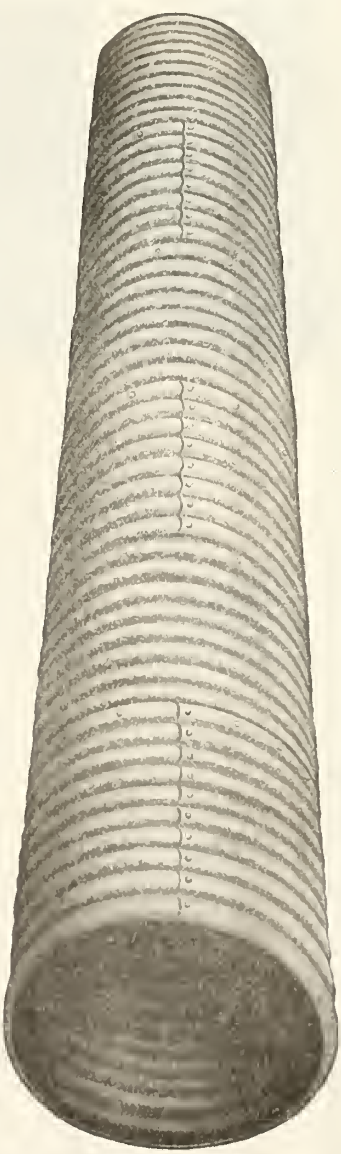
The riveted type of Pedlar Perfect Culvert is made in "Toncan" metal which is 99.94% pure iron product. This means that in the process of manufacture, phosphorus, manganese, silican, sulphur and carbon—all the corrosive elements contained in ordinary iron and steel—are eliminated. Moreover, after all the precautions have been taken to make "Toncan" metal non-corrosive, the sheets are coated with a heavy film or coating of spelter.

It is by the use of this metal that we are able to assure the lasting qualities of

PEDLAR

TONCAN METAL

RIVETED CULVERT



Pedlar Riveted Culvert has lateral, narrow and deep corrugations of greater frequency than in any other length of culvert on the market. It is made to specifications for length, in sizes of an internal diameter from twelve to eighty-four inches. The lengths are in multiples of about twenty seven inches assembled.

The units are stoutly riveted at laps and seams and are delivered "built up" from the factory in the lengths required by specifications.

Joints between these units are made on the field by suitable sheet-metal coupling-bands reinforced with a girdling rod of a sectional area to suit the culvert's diameter. This makes an extremely rigid and non-sagging joint—a joint that is quickly completed and that resists the side pressure of filling dumped over the culvert from one side of the excavation.

Culverts may be graded, bedded and permanently placed with a few hours' labor.

Stock lengths of Pedlar "Toncan" Riveted Culvert may be carried at the supply yard and cut or pieced to fit with slight labor. They may be transported by flat car to the field and rolled into position after setting up.

On request we will also be glad to send Catalogue of Pedlar's Nestable Type Culvert. While of lighter construction than the Riveted Culvert, Nestable Culverts are entirely satisfactory for road boxes and other similar light work.

On request we will be glad to send Catalog 00 with approved set of Specifications adopted by Canadian Railroad Engineers

The PEDLAR PEOPLE LIMITED

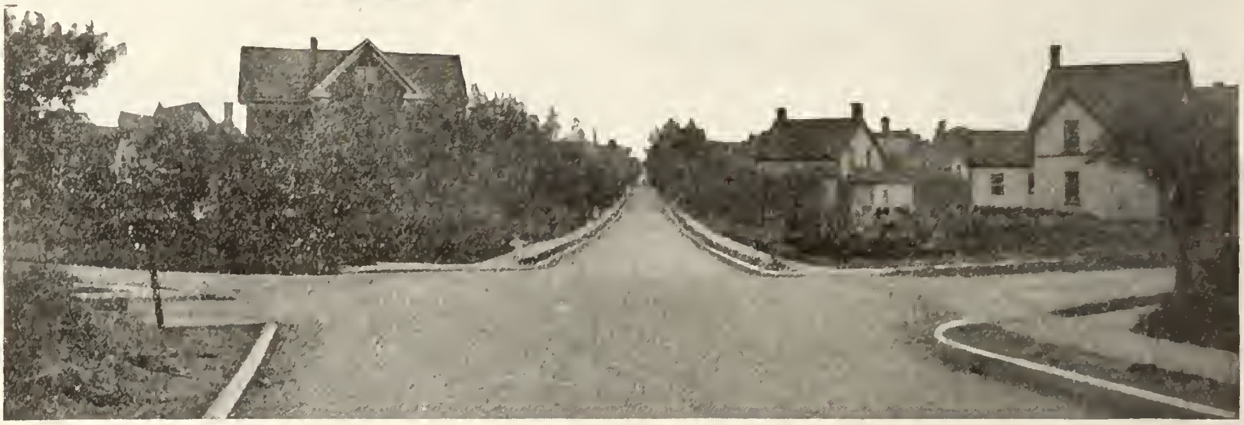
OSHAWA
Established 1861

HALIFAX	16 Prince St.	OTTAWA	423 Sussex St.	CALGARY	Room 7, Crown Block.
LONDON	86 King St.	TORONTO	111-113 Bay St.	VICTORIA	434 Kingston St.
WINNIPEG	76 Lombard St.	CHATHAM	200 King St. W.	ST. JOHN, N.B.	42-46 Prince William St.
MONTREAL	321-3 Craig St. W.	QUEBEC	127 Rue du Pont	VANCOUVER	319 Pender St.
PORT ARTHUR	45 Cumberland St.	REGINA	1901 Railway St. S.	EDMONTON	563 Third St. W.

Address Our Nearest Warehouse. We Want Agents in Some Sections. Write for Details. Mention this Paper.

Tarvia

Preserves Roads
Prevents Dust~



Lancaster St., Berlin, Ont. Constructed with Tarvia X Modern Payment.

Meets Modern Road Requirements

TARVIA is a powerful binder for the surfaces and foundations of macadam roads. It fills the voids and locks the stone in a tough, durable, plastic matrix.

A Tarviated surface looks like sheet asphalt and is equally dustless and clean. It sheds water readily and is dry immediately after the rain, so that pedestrians are not inconvenienced. The surface never gets muddy or dusty.

On account of the Tarvia matrix, these roads will bear heavier automobile traffic than plain macadam because the surface yields instead of pulverizing under the strains. The Tarvia matrix prevents internal movement and grinding.

The plasticity of Tarvia also makes these roads very quiet. Horses' hoofs make almost no sound on a Tarviated road. Tarvia is waterproof, and Tarviated roads, therefore, are protected against damage from torrents on grades.

Tarvia has no odor except when being applied. After it hardens, it has no injurious effect on shoes clothing or vehicles. The cost of using Tarvia is not a factor for consideration, because it has been repeatedly demonstrated that it is cheaper to maintain a dustless road with Tarvia than a dusty one without it. Maintenance economies more than balance the additional cost.

Booklets on request. Address our nearest office.

The Paterson Manufacturing Co. Limited, Montreal, Toronto Winnipeg Vancouver
The Carritte-Paterson Manufacturing Co., Limited, St. John, N.B. Halifax, N.S.

Copper, Iron and Aluminum

With Weatherproof Insulation

WEATHERPROOF
TRADE
WACCO
MARK
WIRES AND CABLES

Slow Burning Wire

Slow Burning Weatherproof Wire

Bare Copper Wire

Imperial Wire & Cable Company Limited, Montreal

THE NORTHERN ELECTRIC & MANUFACTURING CO., Limited
Sales Agents
TORONTO WINNIPEG REGINA CALGARY VANCOUVER

DOORS

That do not warp, sag or crack

GBSM
Midland Brand

Our Doors are made from select material and by expert workmen. Modern facilities and careful attention to details enable us to satisfy you in price and quality.

Let Your Next Order Come to Us

Georgian Bay Shook Mills, Limited
Midland, Ont.

Wheel Barrows

For Every Purpose

We carry a complete stock of "Kilbourne & Jacobs" Barrows, suitable for every requirement. These barrows will out-wear any other make and once you install "K and J" Barrows on your work you will use no other make. They cost no more and when you purchase barrows—you might just as well get the very best. We have a special Barrow Catalogue, which illustrates and describes fully every imaginable style of wheelbarrow—we want you to have a copy—it will surely come in useful—perhaps not now at the moment—but some day.

If you need barrows for your present work—tell us your requirements—we may be able to suggest a type of barrow which will be just what you always wished for. We have so many different styles—Barrows for

Concrete Stone Sand Earth Ashes
Mortar Brick Sawdust Coal
Coke Metals, Etc., Etc.

Drop Us a Line for Copy of Catalogue 30

F. H. Hopkins & Co.

MONTREAL

BRANCH OFFICES: General Supply Company of Canada, Ltd., Winnipeg Agents
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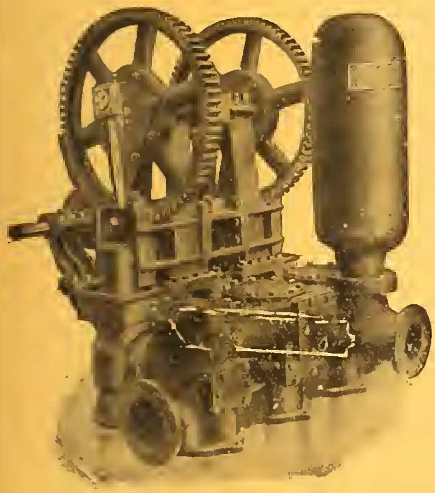
Vol. 26 Toronto, February 28, 1912 No. 9

ESTABLISHED 1886

Contract Record and Engineering Review



We
Manufacture
Steam and
Power
Pumps,
Condensers,
Travelling
Cranes,
Etc.

Write for Catalogue

The **Smart-Turner Machine Company** Limited
HAMILTON, ONTARIO

"MADE IN CANADA"

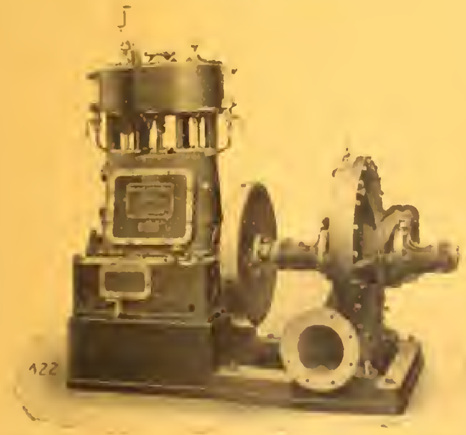
Bent Glass

Made in all
Kinds of
Glass
on Short
Notice

Large Bent Plate Glass for Shop Fronts a Specialty

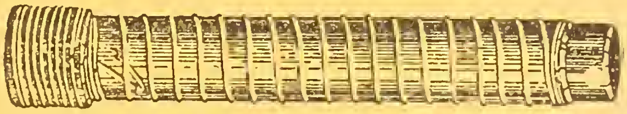
The Toronto Plate Glass Importing Company, Limited
(HILL & RUTHERFORD, Managing Directors)
Head Office and Works : 91 to 133 Don Roadway
TORONTO

Belliss & Morcom Engines
FOR
Centrifugal and Turbine Pumps for Water and Sewage Works



Manufactured by Belliss & Morcom, Birmingham, England.

Agents: LAURIE & LAMB
212 Board of Trade Building ∴ MONTREAL



Continuous and Machine Banded Wood Stave

WATER PIPE

RESERVOIR TANKS

for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

Pacific Coast Pipe Co., Limited
P. O. Box 563 Vancouver, B. C.
Office and Factory, Granville St., near High Bridge
WRITE FOR CATALOGUE
Full Particulars and Estimates Furnished

Alphabetical Index of Advertisers, Page 16 Classified Directory to Advertisements, Page 6

Ambursen Hydraulic Construction Co. of Canada, Limited

Concrete-Steel Dams, Bulkheads, Flumes, Transmission Lines, Power Houses and General Hydraulic Construction.

405 Dorchester Street West - - - MONTREAL

THE

"AMERICAN"

IS THE PROPER MACHINERY FOR HANDLING SAND

The equipment shown in the illustration, consisting of

An "**American**" Stiff Leg Derrick, a Double Drum Belt Hoist and a Three-quarter Yard Clam Shell Bucket, is handling from **sixty to eighty yards of sand per hour.**

The contractors have been piling up profits with this machinery for two years and it's as good as new to-day,

If you wish to write the owners, we will furnish their names.

Name ______

Address ______

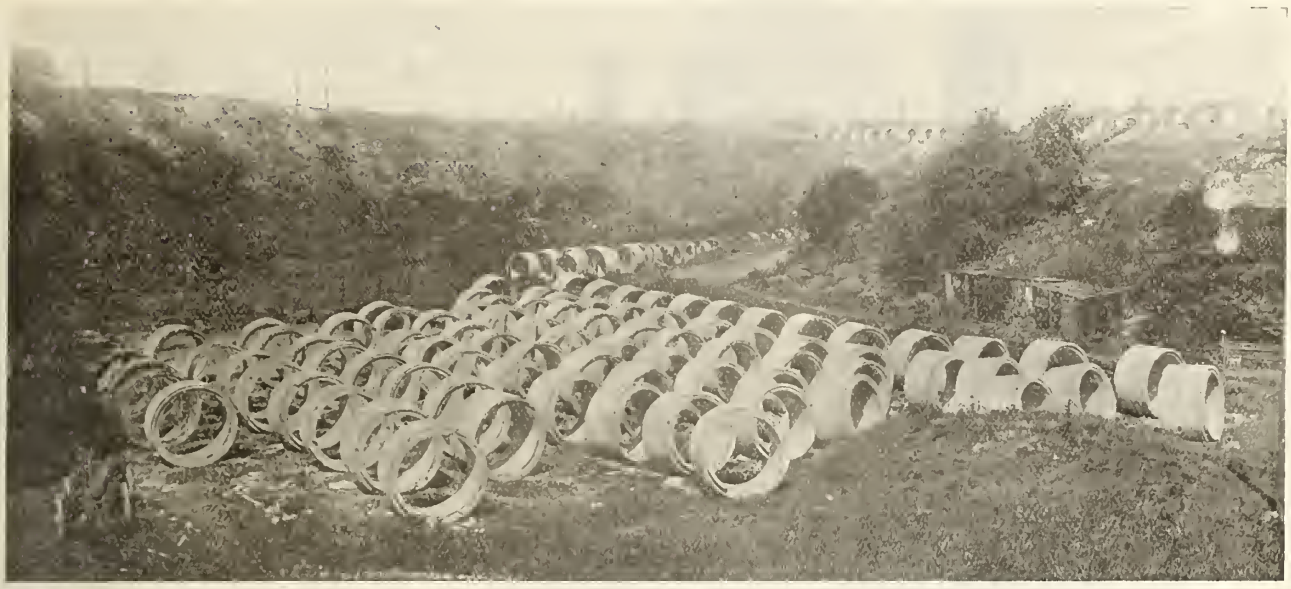
Please send information and price on Derricks for Handling Sand.

AMERICAN HOIST & DERRICK CO
St. Paul, Minn.
C.R. 2/28'12

American Hoist & Derrick Company

St. Paul, U.S.A.

Gorman, Clancey & Grindley, Edmonton, and Calgary, Alta. and Nelson, B.C.
Vancouver Machinery Depot. Ltd., Vancouver, B.C.
The Stuart Machinery Co. Ltd., Winnipeg, Man.



REINFORCED CONCRETE SEWER PIPE. VIEWED FROM C. P. R. TRACK, HAMILTON

If It Passes Our Tests, It Will Meet Your Needs

There is no longer any question about the suitability of concrete for the making of sewer pipes, drains or any work that has to withstand the corrosive effects of acids or the damages inflicted by frost and water.

Reinforced concrete, **properly made,** has been successful in the most rigid tests and is now the recognized material for all important work.

Properly made concrete, means, not only thoroughly mixed and the right proportions of cement, aggregate and sand—it also means that the cement used, be of the highest standard of purity.

The pipes shown here were made in Hamilton, Ont., by the REINFORCED CONCRETE PIPE CO. of JACKSON, MICH. They have made pipes for some of the most important work done, both in the United States and Canada and they now use "Canada" Cement exclusively.

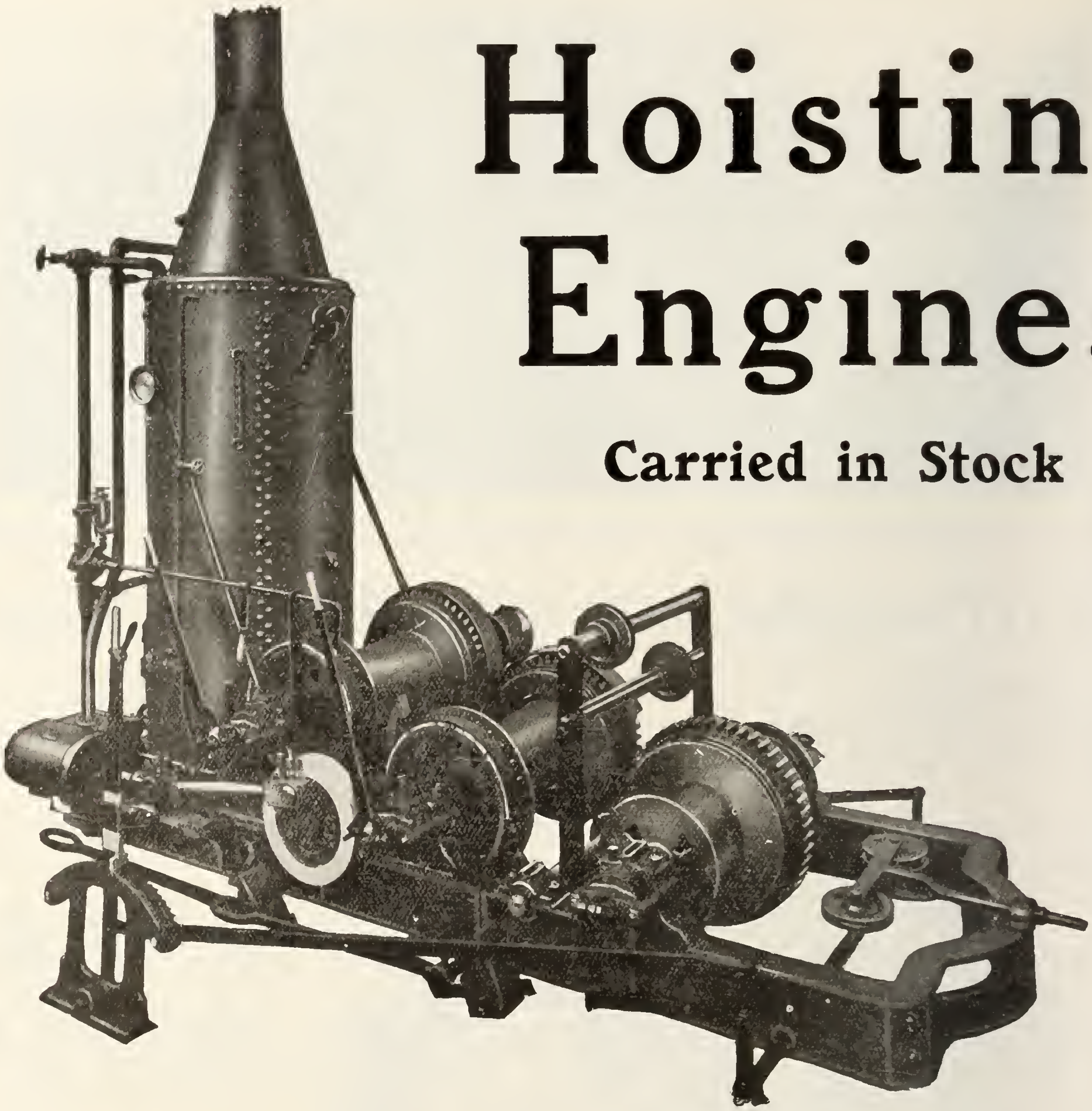
THE REINFORCED CONCRETE PIPE CO., report that although they have, on one piece of work, used cement from no less than five of our mills, they could see no difference in the quality of the cement or in the work produced. That is what the "Canada" Brand stands for:–absolute purity and absolute uniformity.

Canada Cement Co., Limited

MONTREAL - TORONTO - WINNIPEG - CALGARY

Hoisting Engines

Carried in Stock



Standard Double Cylinder, Double Drum Hoist with Boom Swinger

Montreal, 318 St. James St.
Toronto, 73 Victoria St.
Cobalt, opp. Right of Way Mine.

MUSSENS

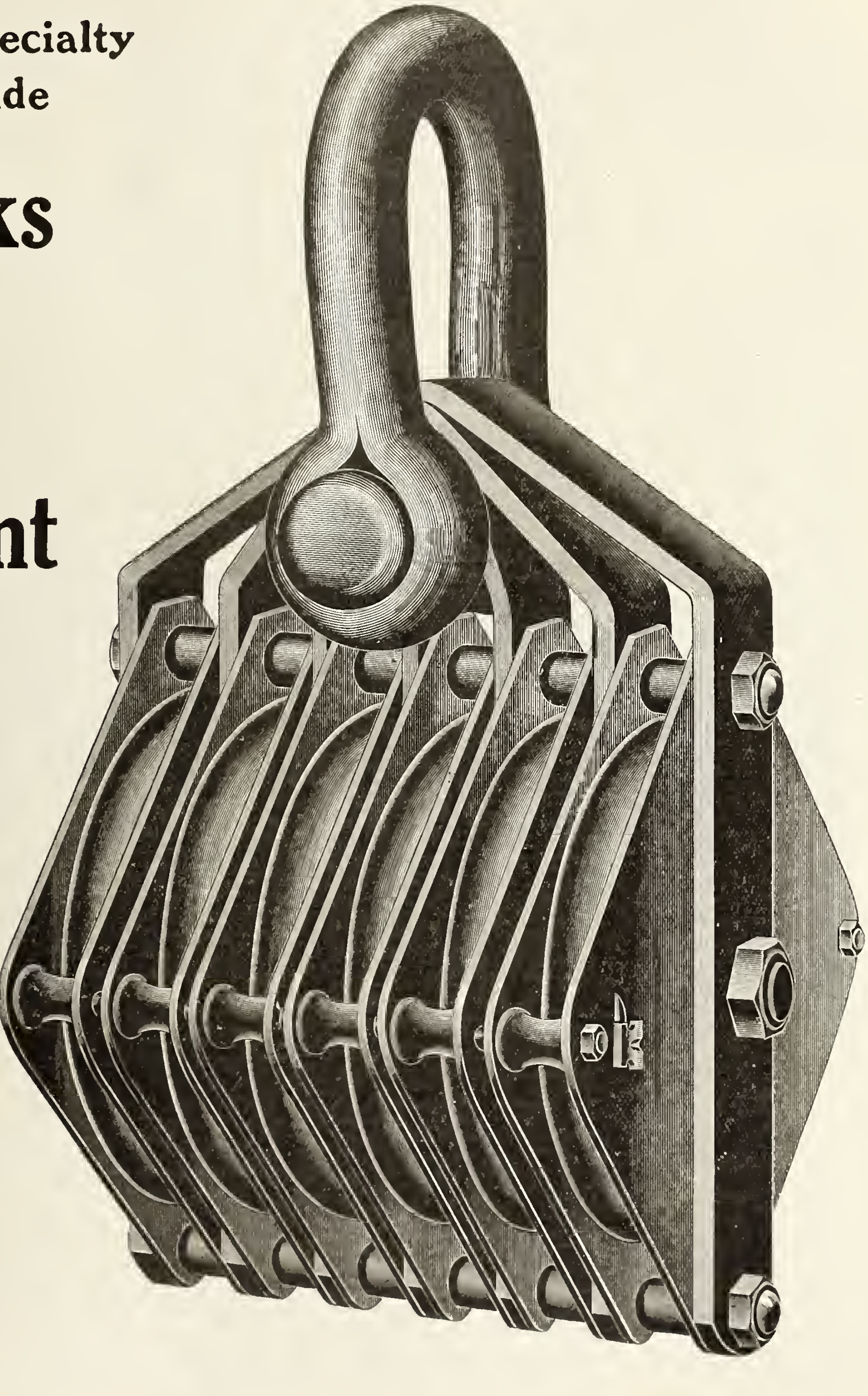
e make a specialty
of High Grade

Derricks

and

Derrick

quipment



Wire Rope,
Blocks,
ittings of All
inds Carried
in Stock

LIMITED

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Calgary, Samis Block
Vancouver, 365 Water Street

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- "Prime White" Road Oil Co.

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- Garlock Packing Co.

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- R.I.W. Damp Resisting Paint Co.

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- American Spiral Pipe Works
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- Albert Mfg. Co.
- Britnell & Co.
- Ontario Lime Association

Plug Drillers
- Canadian Rand Co.

Plumbers' Supplies
- Standard Ideal Co.

Pneumatic Machinery
- Canadian Rand Co.

Portable Saw
- Canadian Fairbanks

Power Engines
- Inglis Co., John

Pumps and Pumping Machiner
- Abenaque Machine Works
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- Bates & Edmonds
- Beatty & Sons, M.
- Canada Foundry Co.
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(Continued on page 12)

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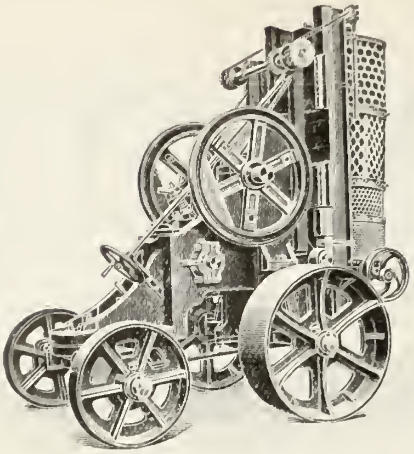

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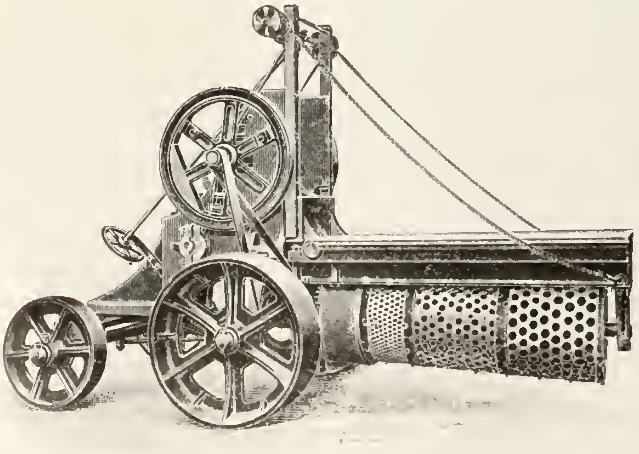

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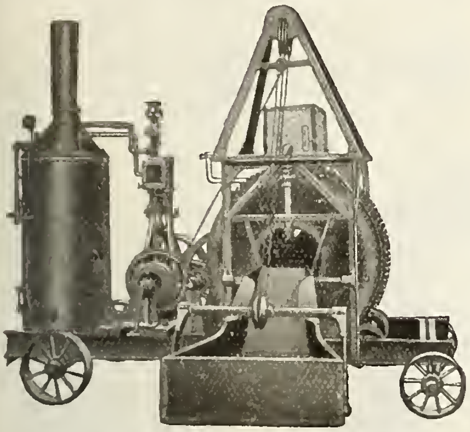

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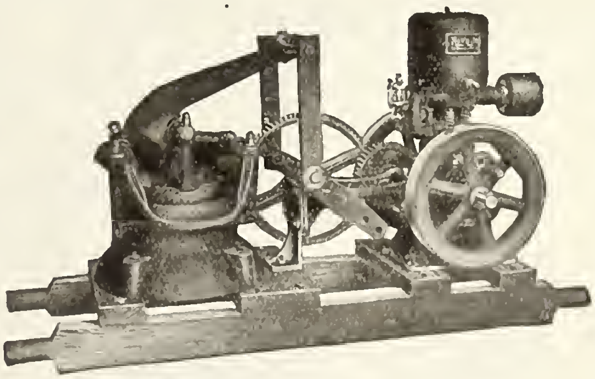

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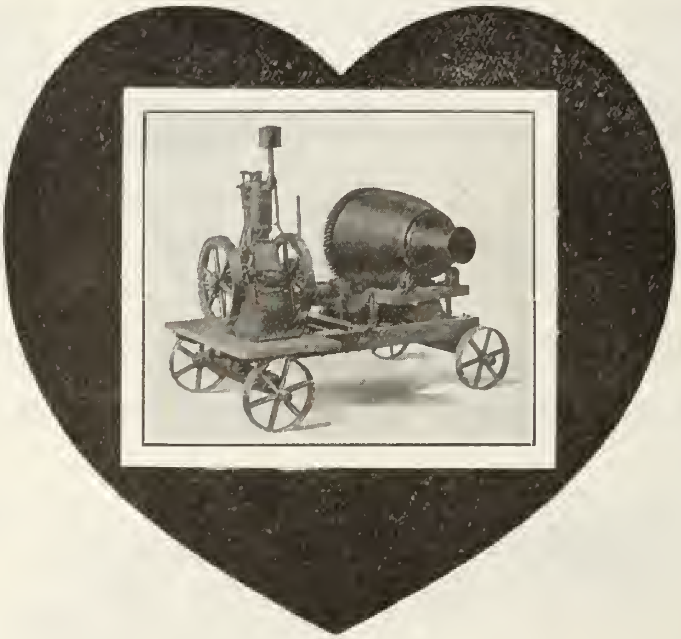

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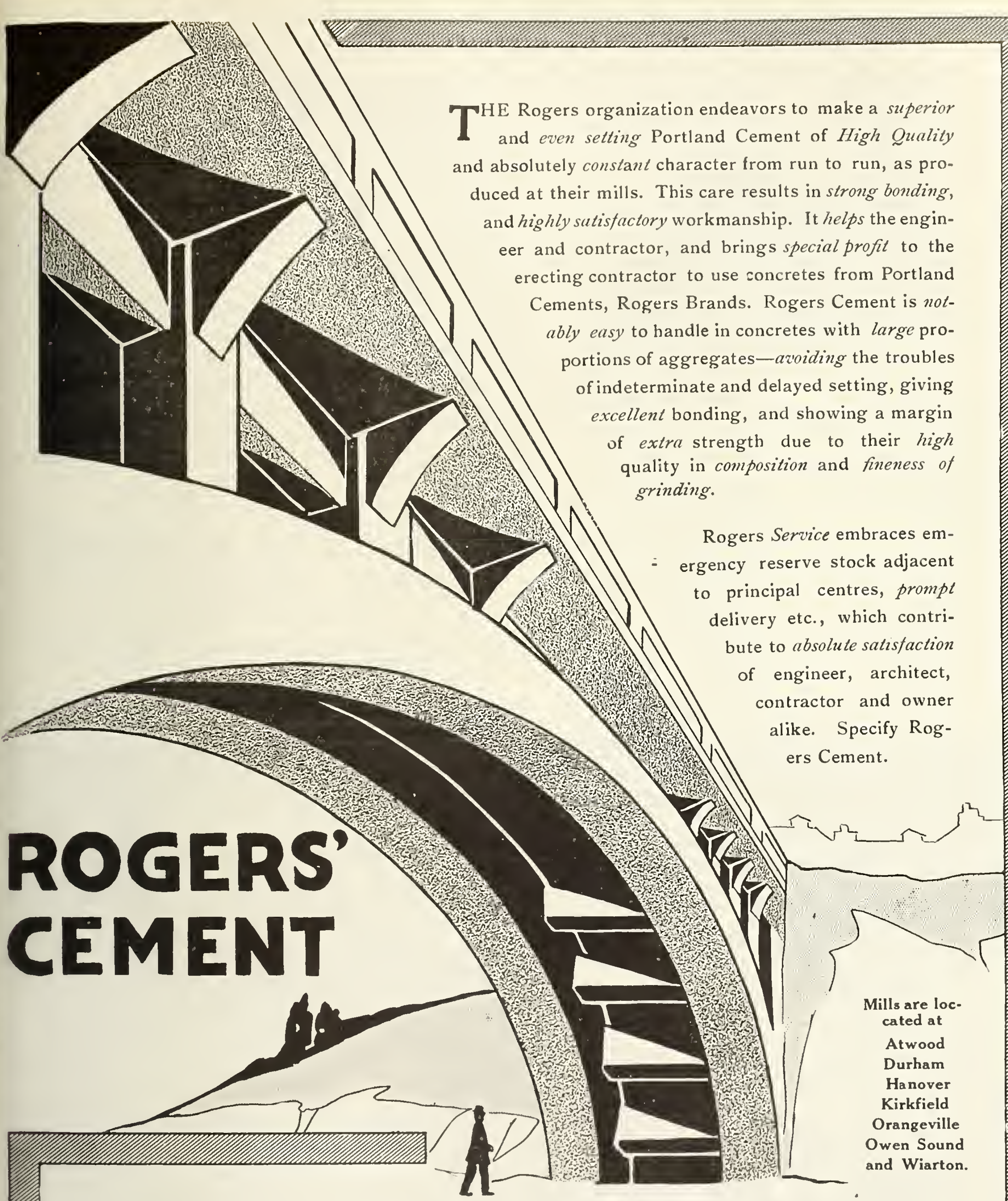

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Pumps and Pumping Machinery
(Continued from page 6)
- Mussens Limited
- Ontario Wind Eng. & Pump Co.
- Smart-Turner Machine Co.
- Waterous Engine Works Co.

Quarry Machinery
- Canadian Rand Co.
- Improved Equipment Co.
- Johnston & Chapman
- George Anderson & Co.

Railway Supplies
- Ford Iron Co.
- Gartshore, John J.
- Hopkins & Co., F. H.
- Mussens Limited

Reinforcements, Concrete & Steel
- Ambursen Hydraulic Cons. Co.
- Canada Wire & Iron Goods Co.
- Factory Products
- Ford Iron Co.
- Greening Wire Co., B.
- Leach Contracting Co.
- Page Wire Fence Co.
- Steel Co. of Canada
- Steel & Radiation
- Trussed Concrete Steel Co.
- Turner, C. A. P.

Revolving Stone Screens
- Greening Wire Co., B.
- Johnson & Chapman Company

Road Machinery
- Erie Machine Co.
- Ford Iron Co.
- Hamilton Machinery Co.
- Morrison & Co., T. A.
- Mussens Limited
- Western Wheeled Scraper Co.
- Waterous Engine Works Co.

Roofing Materials
- Asbestos Mfg. Co.
- Canadian Supply Company
- Galt Art Metal Co.
- Metallic Roofing Co.
- Metal Shingle & Siding Co.
- Noble, Clarence W.
- Paterson Mfg. Co.
- Standard Paint Co.

Rubber Belting
- Goodyear Tire & Rubber Co.

Safes and Vaults
- Taylor, J. & J.

Sand Spreader
- Aut. Sidewalk Sand Sp'd'r. Co.

Sand and Gravel
- Rogers Supply Co.
- Sand & Supplies
- York Sand and Gravel Co.

Screens
- Greening Wire Mfg. Co., B.
- Johnson & Chapman Company

Sewer Pipe
- Britnell & Co.
- Canada Iron Corporation
- Dominion Sewer Pipe Co.
- Ford Iron Co.
- Gartshore Thomson Pipe Co.
- National Iron Works
- Ontario Sewer Pipe Co.
- Ontario Lime Association
- Smyth & Ryan
- Standard Drain Pipe Co.

Shovels (Steam)
- Browning Engineering Co.
- Beatty & Sons, M.
- Canada Foundry Co.
- Ford Iron Co.
- Hopkins & Co., F. H.
- Montreal Locomotive Works
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- Willis Shaw Mach. Co.

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- Des Moines Bridge Co.

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- Sturtevant Co., B. F.

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- Factory Products
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- Britnell & Co.
- Brodie, Jas.
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- Rouleau, Joseph N.

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- Canadian Rand Co.

Tanks and Stand Pipes
- Berg Machinery Co.
- Des Moines Bridge Co
- Inglis, John
- Jenckes Machine Co.
- Marsh & Henthorn
- McDougall Caledonian Iron Wks
- Ontario Wind Eng. & Pump Co.
- Piggott & Co., Thos.

Technical Journals
- Ainsworth & Sons, Wm.

Tents
- Turner & Sons, J. J.
- Woods Limited

Testing and Inspection Bureau
- Hunt & Co., Robt. W.

Valves
- Canada Iron Corporation
- Gartshore-Thomson Pipe Co.
- Kerr Engine Co.

Waterproofing
- Ceresit Waterproofing Co.
- Chillas-Black
- Ontario Lime Association

Ventilating & Heating Apparatus
- Sturtevant Co., B. F.

Veterinary Remedies
- Johnson, A. H.

Water Softeners and Filters
- American Water Softener
- Berg Machinery Co.

Water Turbines
- Canadian Boving Co.
- Escher Wyss & Co.

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- Canadian Boving Co.
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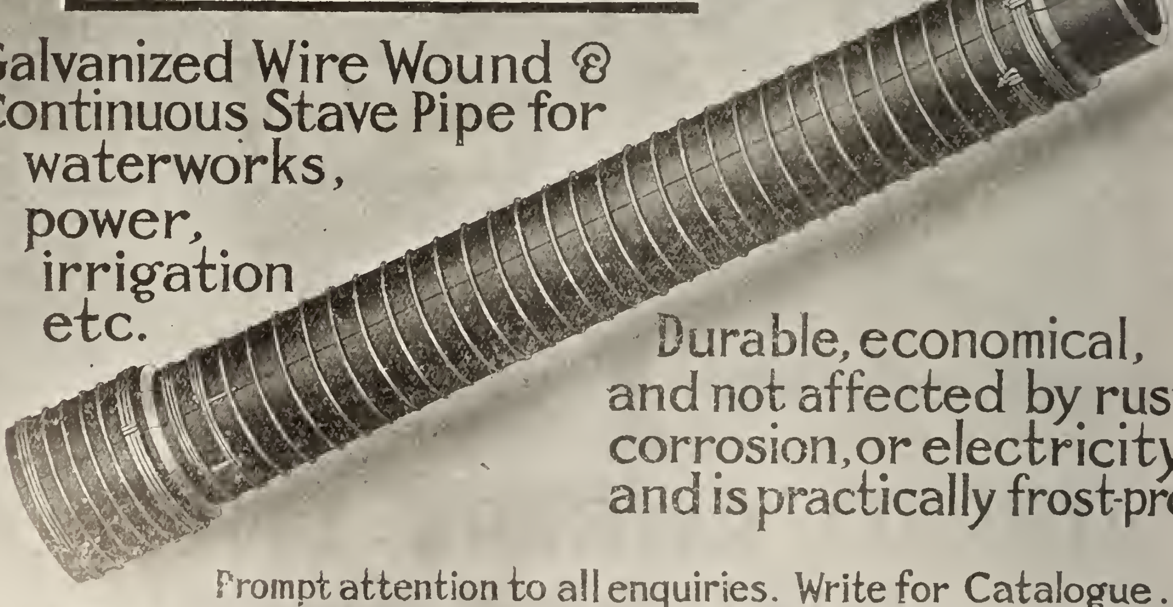

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get a full load at every grab

WIDE OPENING
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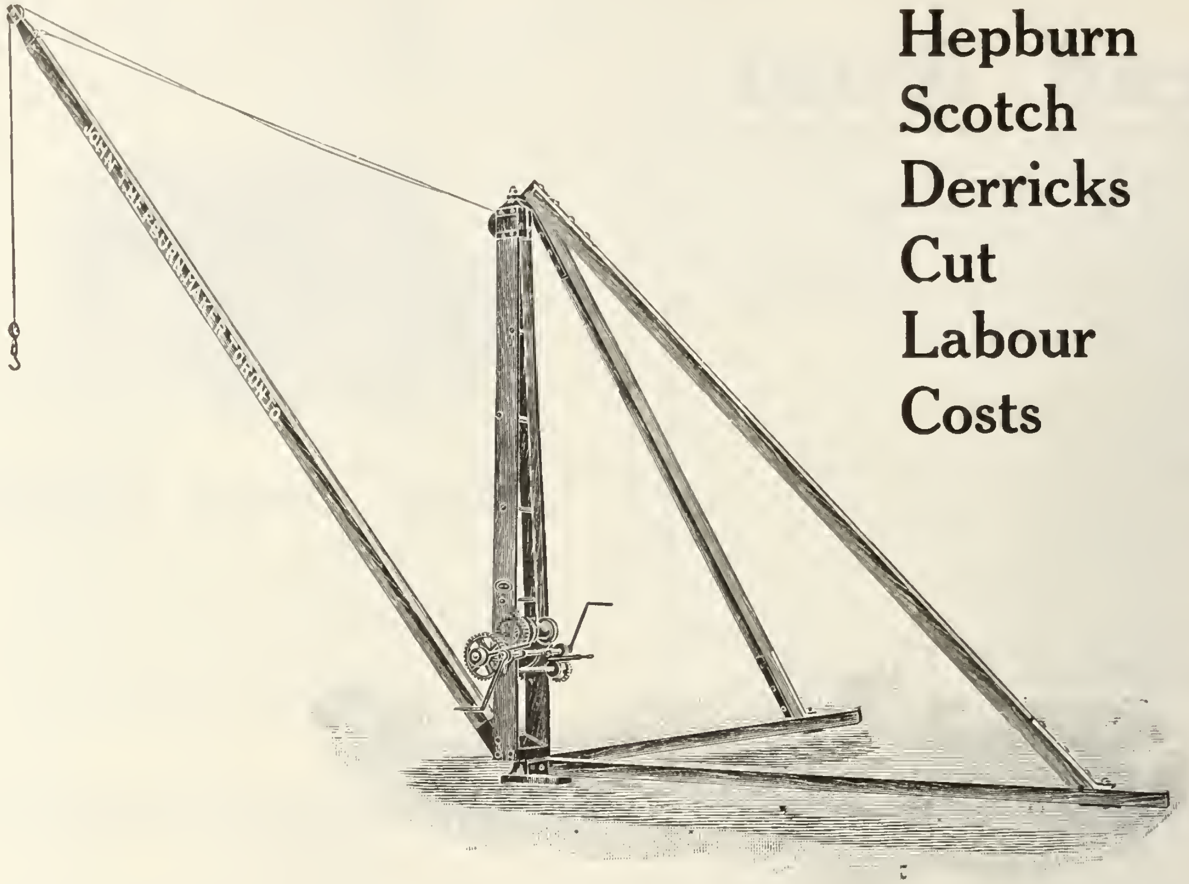
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Our Derricks are made—and stocked—in standard sizes, from ½ ton up. We can ship interchangeable parts on short notice.

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Abenaque Machine Works	94
Acme Equipment & Engineering Co.	74
Ainsworth & Sons, Wm.	25
Albert Manufacturing Co.	
Alsen's American Portland Cement Wks.	78
Ambursen Hydraulic Construction Co. of Canada, Limited	2
American Enameled Brick & Tile Co.	82
American Hoist & Derrick Co.	2
American Spiral Pipe Works	79
American Water Softener Co.	74
American Well Works	104
Anderson & Co., 1905 Ltd. George	22
Andresen, H. P.	13
Asbestos Mfg. Co.	99
Automatic Wood Box & Turning Co.	82
Bain & Ross	92
Bates & Edmonds Motor Co.	23
Batts Limited	
Beatty & Sons Limited, M.	79
Beckman Company, L.	85
Bell Filtration Co. of Canada, Ltd.	23
Bennett, Robert	
Bennett, Robert	72
Berg Manufacturing Company	
Blystone Manufacturing Company	99
Bowman & Connor	92
Bremner Limited, Alex.	91
Britnell & Co., Ltd.	86
Brodie & Company, James	72
Brown Hoisting Machinery Co.	83
Browning Engineering Company	83
Buffalo Meter Co.	27
Business Systems Limited	95
Bryan Manufacturing Company	
Canada Cement Co., Ltd.	3
Canada Foundry Co., Ltd.	20-73-97
Canada Iron Corporation Limited	91
Canada Steel Company	31
Canadian Store Front Company	85
Canada Wire & Cable Co.	23
Canada Wire & Iron Goods Co.	79
Canadian Boving Company	30
Canadian Bridge Co., Ltd.	88
Canadian Fairbanks-Morse Co., Ltd.	22
Canadian Kellogg Company	35
Canadian Office and School Furniture Company, Limited	
Canadian Norcross Bros. Co.	18
Canadian Pipe Co., Ltd.	90
Canadian Rand Co., Ltd.	103
Canadian Supply Company	
Cement Era Publishing Company	
Ceresit Waterproofing Company	
Chain Belt Company	34
Chipman & Power	92
Christie Henderson & Company	79
Cleveland Bridge & Engineering Co., Ltd.	88
Cleveland & Erie Mach. Co.	87
Cloisonne Glass Co. of Canada	101
Colonial Glass Co. of Canada	96
Cook, A. D.	98
Commercial, The	72
Conduits Company, Limited	91
Consolidated Glass Company	
Consumers' Gas Company	101
Consolidated Optical Co., Ltd.	
Consolidated Stone Company	98
Contractors' Supply Co., Ltd.	86
Corinthian Stone Co.	24
Cream City Equipment Co.	96
Crushed Stone Limited	95
Dahlstrom Metallic Door Company	94
Dennis Wire & Iron Works Co., Ltd.	90
Des Moines Bridge & Iron Co.	79
Dickson Bridge Works Co., Ltd.	
Doolittle & Wilcox Limited	91
Dominion Bridge Co., Limited	88
Dominion Creosoting Company	76
Dominion Marble Co., Ltd.	21
Dominion Sewer Pipe Co., Ltd.	21
Dominion Wood Pipe Co., Limited	12
Don Valley Brick Works	7
Down Draft Furnace Company	98
East Iron & Machine Co.	78
Eastern Pipe & Construction Co., Ltd.	80
Eaton & Co., T.	
Erie Machine Shops	94
Factory Products Limited	35
Farmer, John T.	92
Ferguson, H. S.	92
Ford Iron Company, Limited	8
Foundation Company	
Fuce, Edward O.	92
Galt Art Metal Co., Limited	85
Galt Engineering Co., John	92
Garlock Packing Company	
Gartshore, John J.	92
Gartshore-Thompson Pipe & Foundry Co., Ltd.	90
General Machinery Co., Ltd.	
Georgian Bay Shook Mills, Ltd.	107
Gibb, Alexander	74
Goodyear Tire & Rubber Co. of Canada, Ltd.	33
Greening Wire Co., Led., B.	102
Guarantee Company of North America	92
Gurley, W. & L. E.	84
Hagersville Contracting Co., Ltd.	13
Hamilton Pressed Brick Co.	
Hamilton Machinery Co., Ltd.	26
Hancock, Jr., H. Syd.	92
Harvey, J.	87
Heinicke Inc., H. R.	
H. & E. Lifting Jack Co.	
Hepburn, John T.	14
Hobbs Manufacturing Co., Ltd.	86
Holmes & Sons, Fred	
Hopkins & Company, F. H.	108
Hotchkiss Lock Metal Form Co.	26
Hunt & Company, Robert W.	92
Hunter Bridge & Boiler Co., Ltd.	89
Imperial Wire & Cable Co., Ltd.	107
Improved Equipment Company	
Inglis Company, John	71
International Marine Signal Co., Ltd.	29
Jamieson Lime Company	
Jenckes Machine Company, Limited	
Johnston, A. H.	101
Johnston & Chapman Company	
Kennedy, James C.	92
Kerr Engine Company, Limited	93
Koehring Machine Co.	32
Laurentian Granite Co., Ltd.	92
Laurie & Lamb	1
Lea, R. S.	92
Leach Concrete Company	
Leonard & Sons, E.	95
London Concrete Machinery Co., Ltd.	9
London Gas Power Company, Ltd.	75
Luxfer Prism Company	102
Mace, T. Harry	92
MacKinnon Holmes & Co., Ltd.	
MacLean Daily Reports	100
Marsh & Henthorn Limited	75
McCoy Company, Henry J.	25
McDougall Caledonian Iron Wks. Co., John	73
Mahan & Company	
McMillan & Sons, W. N.	
McNally & Co., William	89
Meadows, George B.	35
Metallic Roofing Company, Ltd.	75
Metropolitan Paving Bricks Co.	31
Miller & Company, George M.	87
Mitchell, Chas. H. & Percival H.	92
Mitchell Company, Ltd., Robert	88
Mitshkun Company, M.	94
Mississquoi Marble Co., Ltd.	82
Montreal Locomotive Works, Ltd.	95
Morrison & Co., T. A.	92
Munderloh & Co., Ltd.	13
Mussens Limited	4
Myers, Oakley	95
National Bridge Co., of Canada, Ltd.	89
National Iron Works Ltd.	91
Neptune Meter Co.	27
Noble, Clarence W.	78
Northwestern Terra Cotta Company	83
Ontario Asphalt Block Co., Limited	78
Ontario Lime Association Limited	77
Ontario Sewer Pipe Co., Ltd.	20
Ontario Wind Engine & Pump Co., Ltd.	95
Ormsby, Limited, A. E.	19
Owen Bucket Company	74
Pacific Coast Pipe Co., Ltd.	1
Page Wire Fence Company, Ltd.	83
Paterson Manufacturing Co.	
Pedlar People Limited	105
Phoenix Bridge & Iron Works, Limited	89
Piggott & Company, Thos.	80
Port Credit Brick Co., Ltd.	90
Power & Son	87
"Prime White" Road Oil Company	106
Pyle-National Electric Headlight Co.	17
Queenstown Quarry Co., Ltd.	91
Reid & Brown	92
Rhodes Curry Company, Limited	75
"R. I. W." Damp Resisting Paint Co.	17
Rogers Limited, Alfred	11
Rogers Supply Company	25
Roman Stone Co., Limited	15
Sackville Freestone Co., Ltd.	29
Sand & Supplies, Ltd	89
Sarnia Bridge Co., Ltd.	89
Sheppard & Sons, James	
Slack, T.	
Smart-Turner Machine Co., Ltd.	1
Smith, Limited, Thomas & Wm.	
Smyth & Ryan	86
Standard Drain Pipe Co., Ltd.	21
Standard Foundry & Machine Co.	
Standard Ideal Co., Ltd.	36
Standard Scale & Supply Co.	
Steel Company of Canada	30
Steel & Radiation, Limited	28
Steward, A. P.	74
Stinson-Reeb Builders' Supply Co.	36
Sturtevant, B. F.	94
Taylor, J. & J.	86
Tide Water Iron Works	77
Thew Automatic Shovel Co., The	31
Thompson & Co., B. & S. H.	21
Tiffin Wagon Company	
Toledo Wheelbarrow Company	98
Toronto Furnace & Crematory Co.	
Toronto Plate Glass Importing Co., Ltd.	1-83
Troy Wagon Works Co.	82
Trussed Concrete Steel Co.	82
Turner, C. A. P.	101
Turner & Sons, J. J.	99
Union Water Meter Co.	27
Universal Crusher Company	26
Vulcan Iron Works	96
Wadsworth Howland & Co., Inc.	79
Waterous Engine Works Co., Ltd.	77
Watson Wagon Company	
Watts & Son. E. R.	32
Weeks, Arthur L.	92
Wells & Gray, Ltd.	
Western Canada Contractor	86
Western Wheeled Scraper Co.	13
Wettlaufer Bros.	10
Whitehead & Co., Ltd., John	80
Wilson Bros., Ltd.	84
Woods Limited	27
York Sand & Gravel Co.	86

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ESTABLISHED 1848

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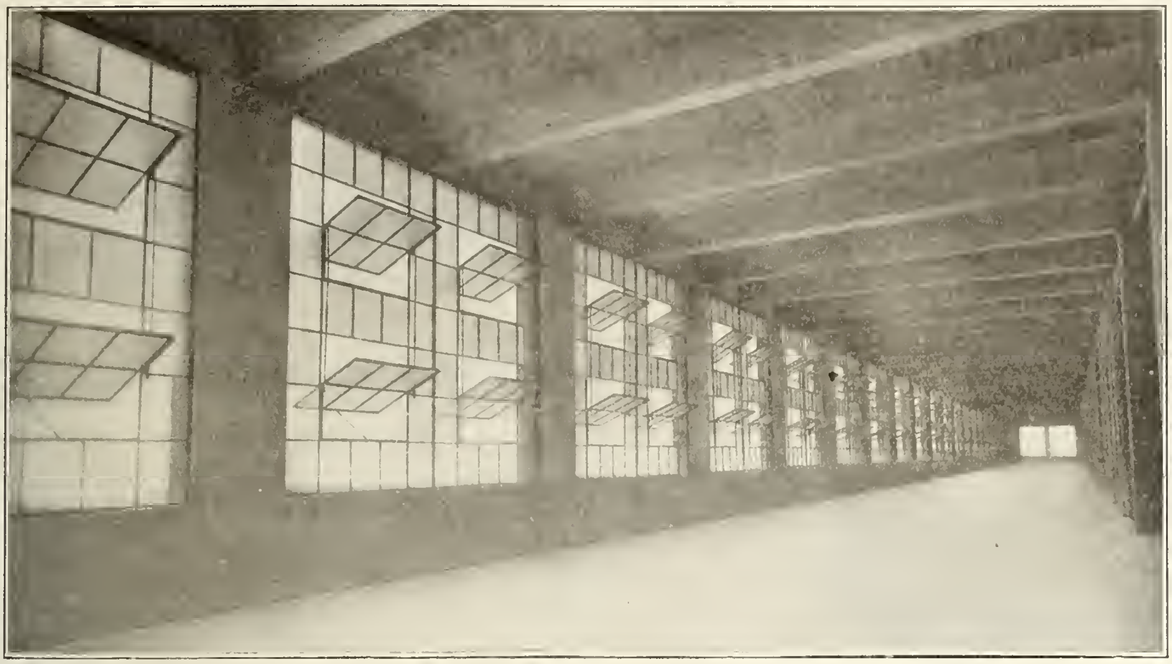

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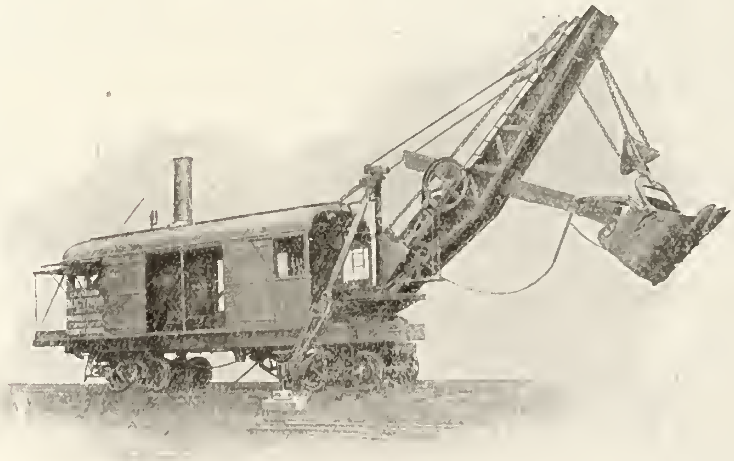

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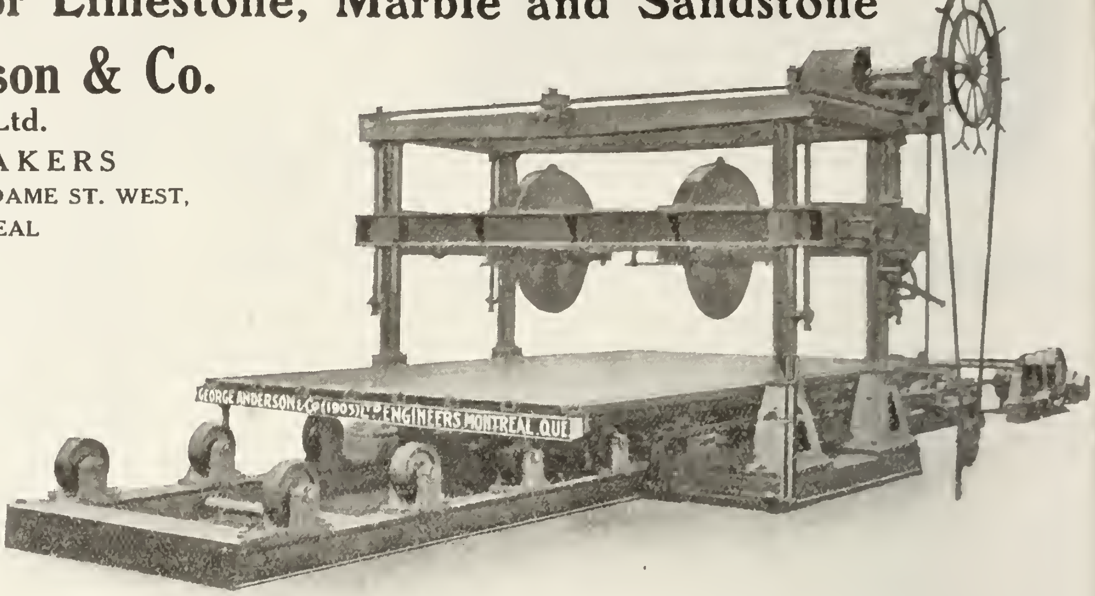

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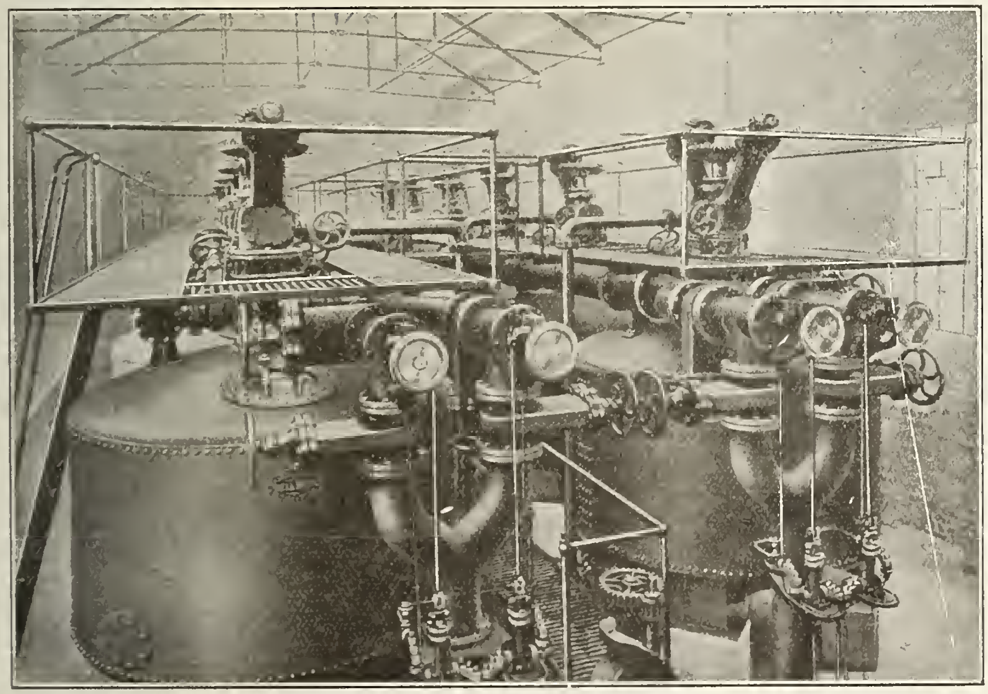

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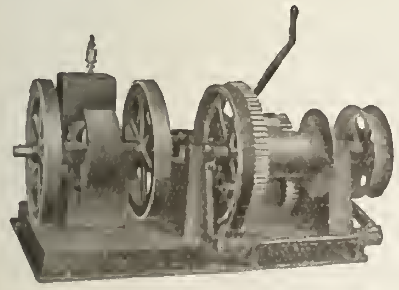

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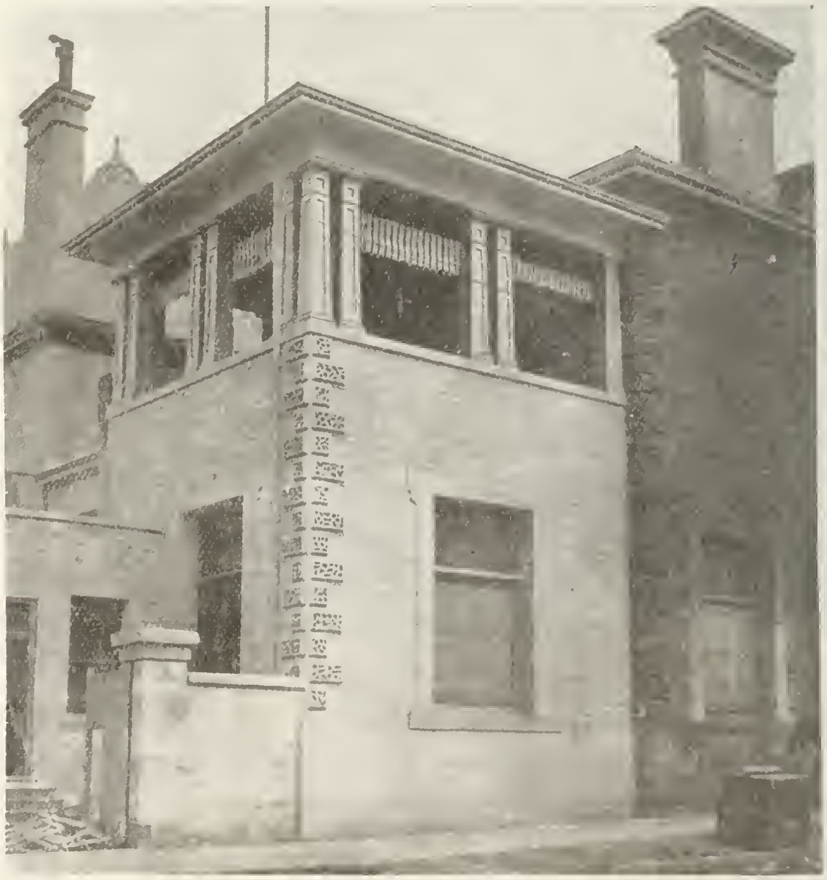

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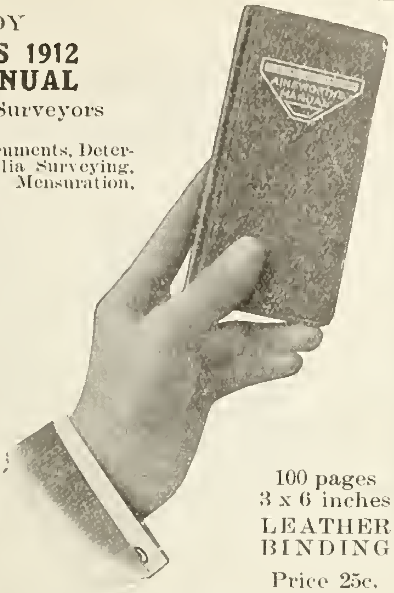

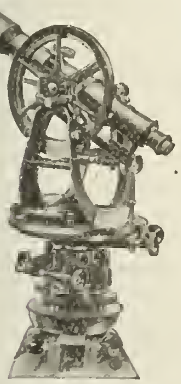

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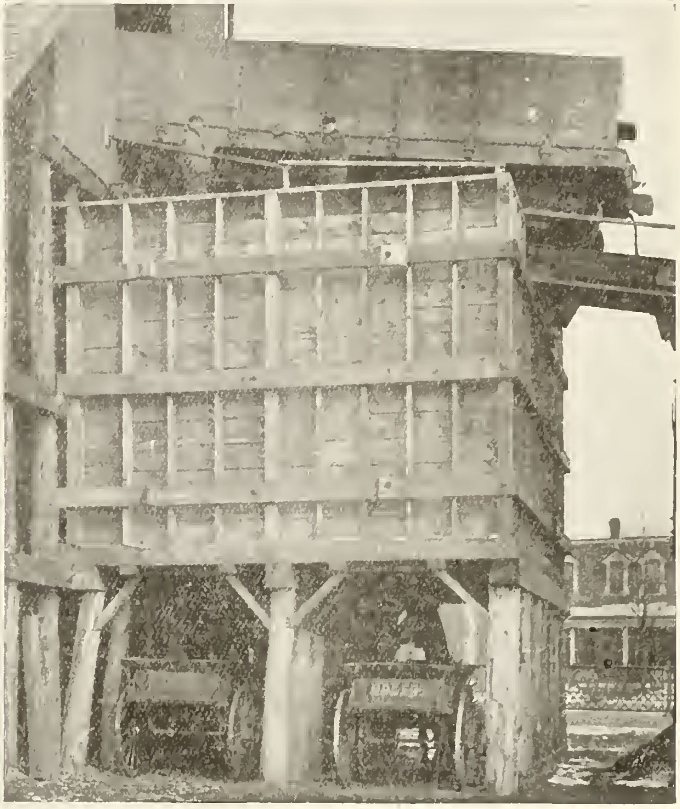

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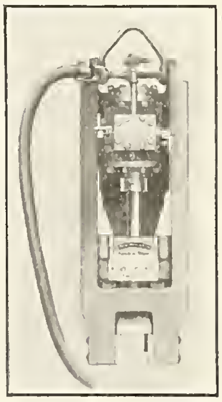

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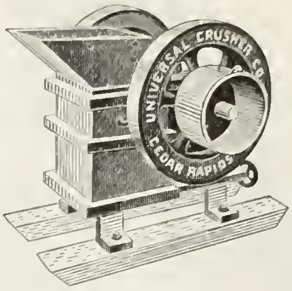

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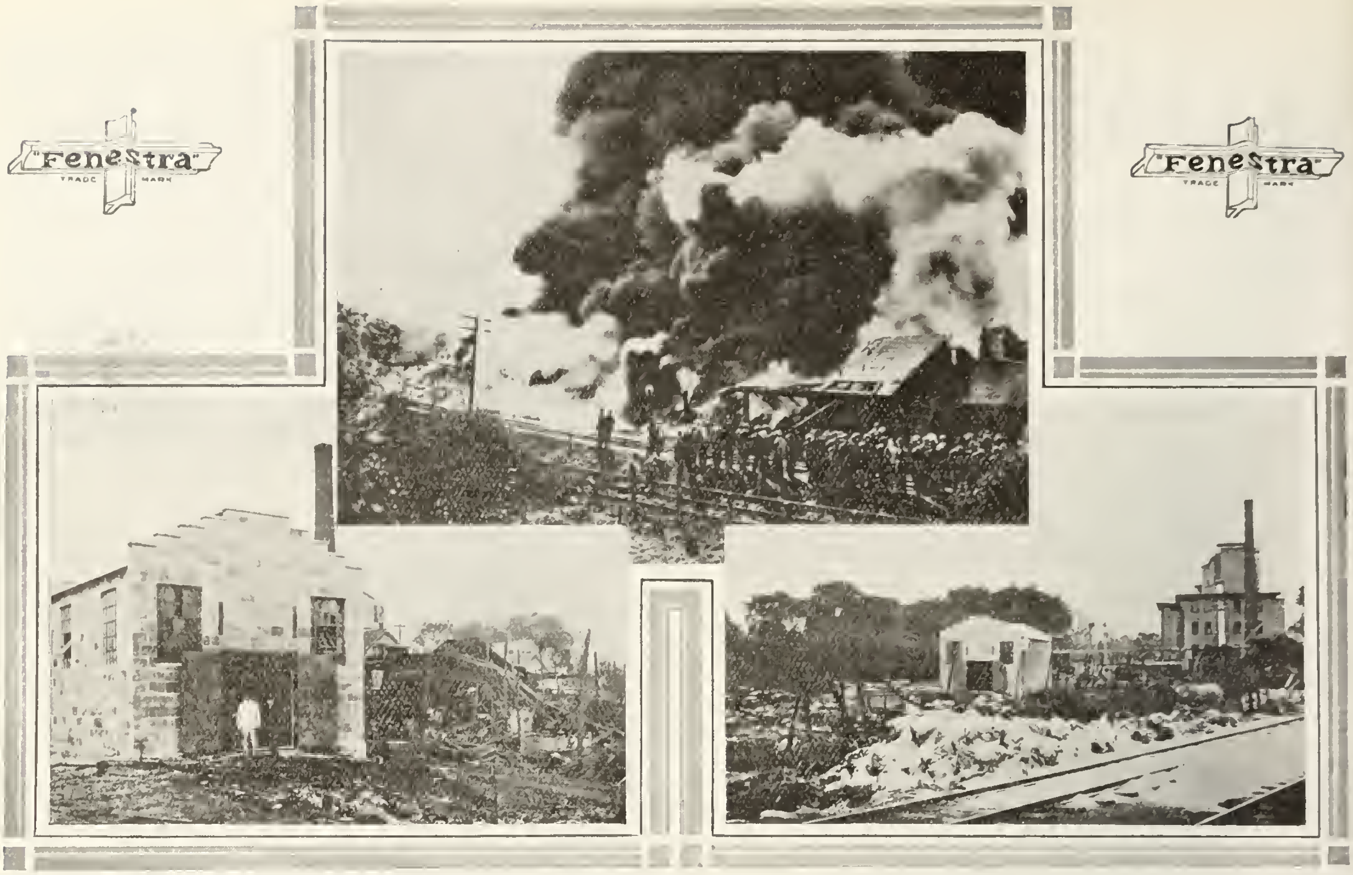

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WHEN the plant of the Vera Chemical Co., at Stoneham, Mass., with its contents of 2000 barrels of rosin and turpentine went up in smoke in September this question was again answered emphatically and convincingly.

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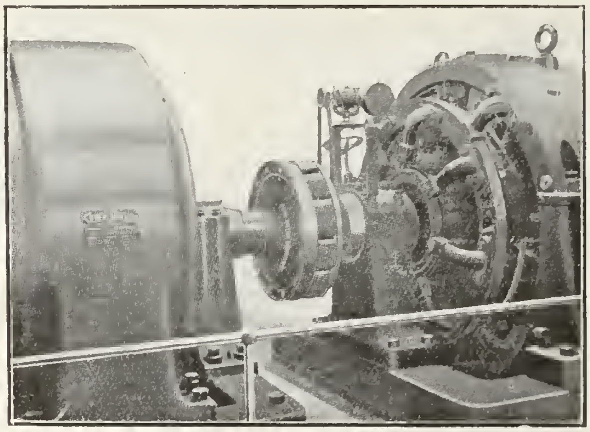

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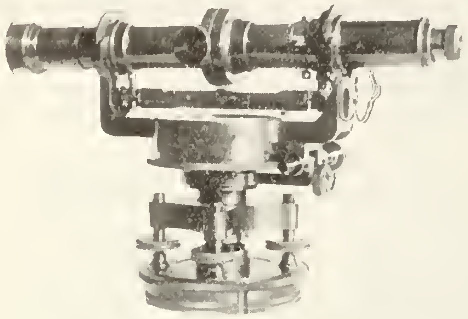

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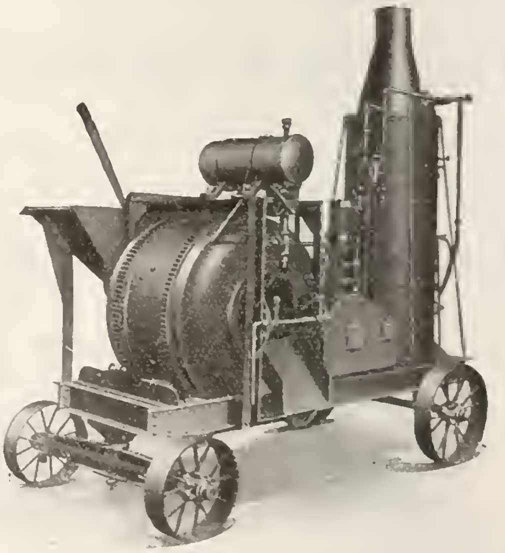

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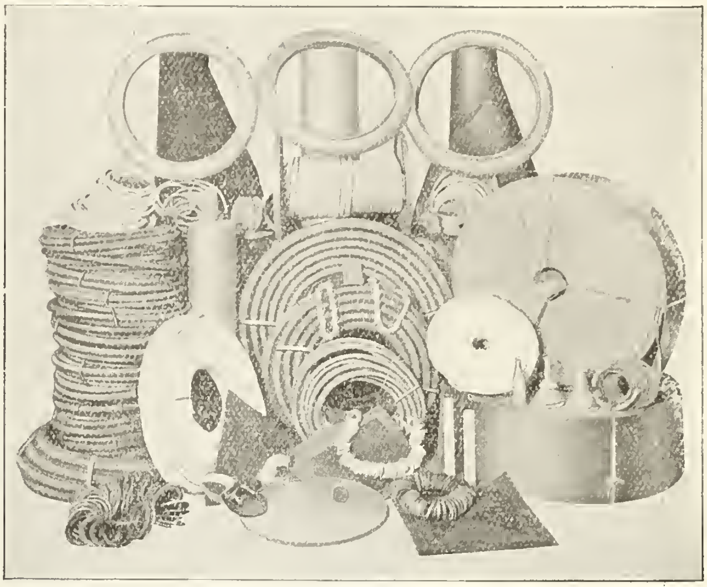

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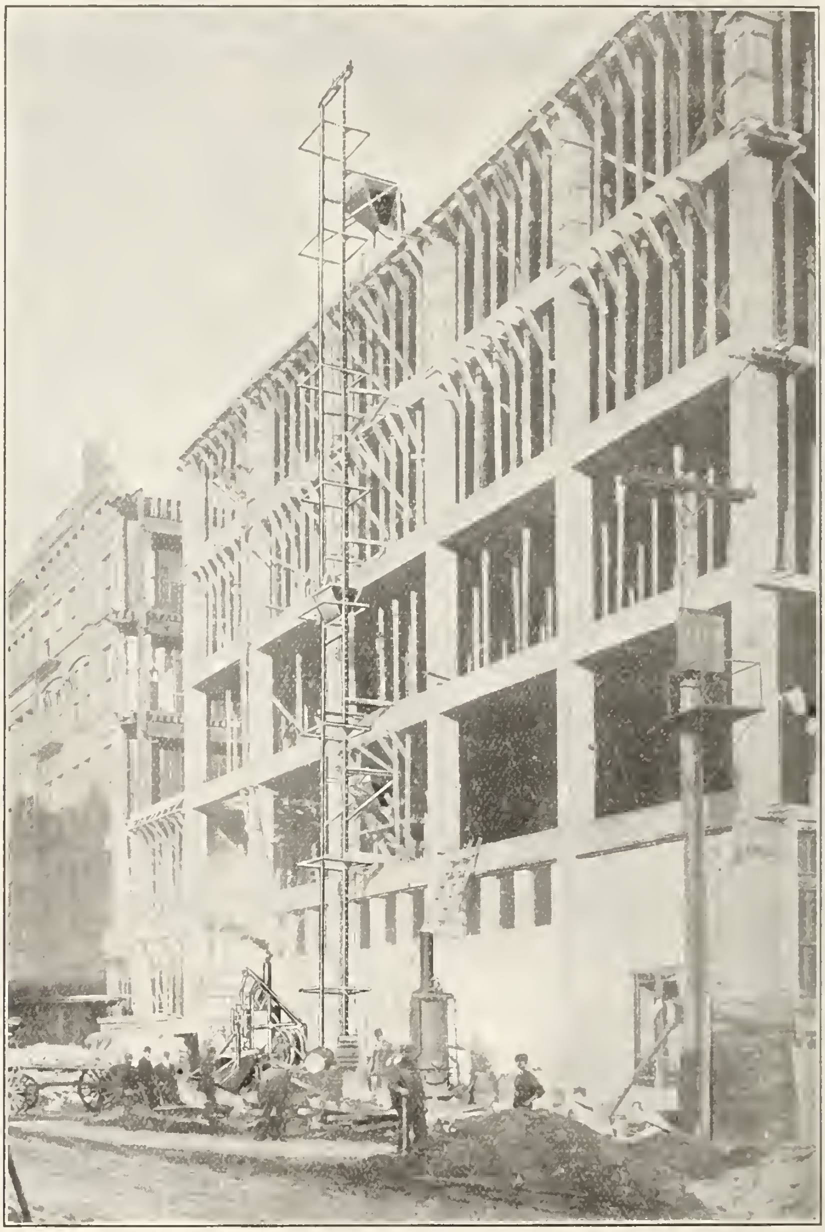
(13)

Mixing and Elevating Concrete



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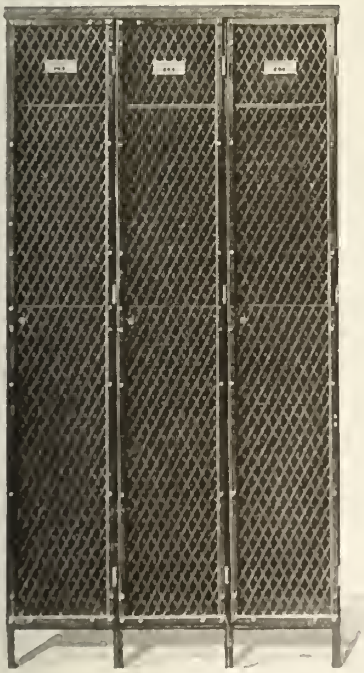

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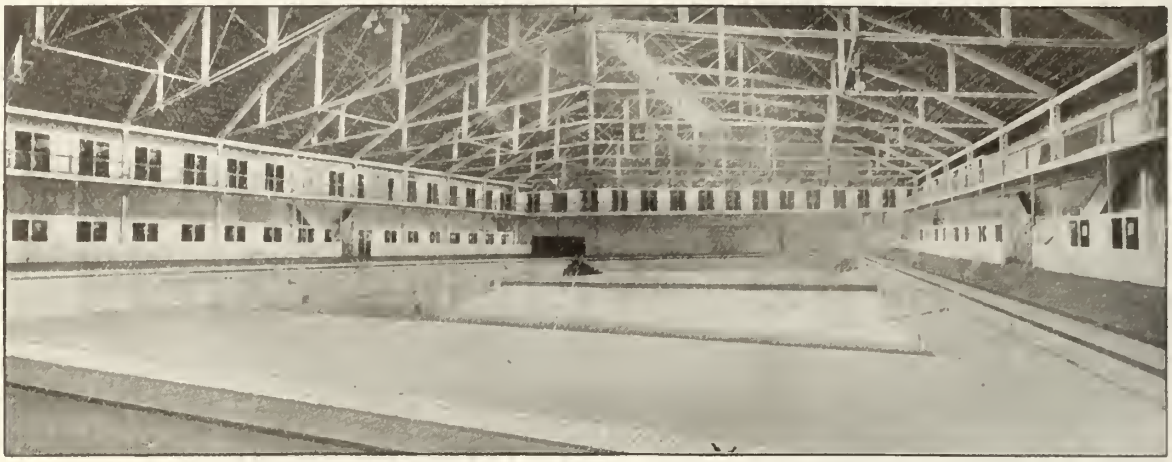

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St. Louis, Mo., Nov. 8, 1908.

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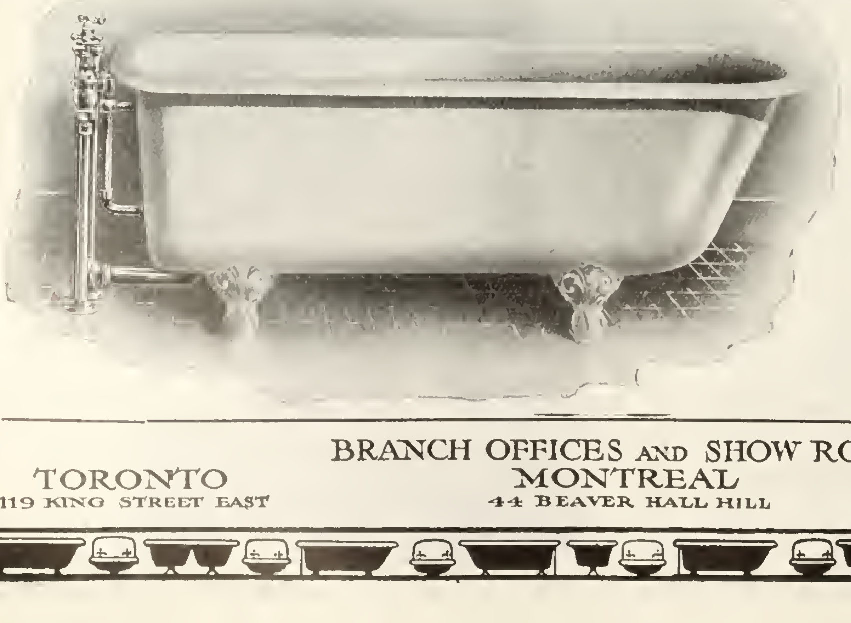

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Contract Record
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Alphabetical Index of Advertisers
Page 16

Vol. 26 February 28, 1912 No. 9

A Truly National Convention

WHEN Rudyard Kipling delivered himself of those famous lines, "For east is east and west is west, and never the twain shall meet," he must have been thinking upon an altogether larger scale than Canada, if it is fair to take, as a criterion, the recent Toronto convention of the Canadian National Association of Builders' Exchanges. The feature of this meeting was the manner in which the master builders from all parts of Canada came together for the discussion of trade topics and the consideration of means likely to advance the interests of the whole community. Men from Edmonton, Calgary, Lethbridge and Winnipeg were there in force, rubbing shoulders with the delegates from old Quebec and Montreal. There was unity in their aims. Their common cause was the advancement and protection of a great industry. We have already commented upon the success with which this association is meeting and it is only necessary to read the report of the convention published elsewhere in this issue to realize the greatness of the work. We know of no other association in Canada that has greater possibilities than the Canadian National Association of Builders' Exchanges. The possibilities of the future may be gauged in a measure by what has been accomplished in the six short years since the organization of the body. The builders of Canada are taking a much needed cue from the labor interests. They are proving the value of what it means to "get together and stick together"—to use the convention slogan. There are yet many scattered building units all over Canada, but we do not doubt that with the development of the C. N. A. B. these will be gathered into the fold and that there will be one mighty organization of the constructional interests—an organization whose principles are founded on equity and honor and whose aims are to improve the ethics of the business and to raise the standard in every branch of construction. The C. N. A. B. might have such a motto as "Defence not Defiance." We all know the great power that is needed for adequate defence. In its own sphere the Canadian National Association of Builders is arriving at that plane where, like the British Empire, it neither seeks a quarrel nor fears one. Such an association is eminently useful in the greatest building country of all time. Canada is only at the threshold of her development and yet the C. N. A. B. has already more than justified its organization. In another ten years—nay, in five, for events pass quickly in Canada, the association should wield a power that will be a strong influence in the land. In those days they will go to Ottawa not as humble suppliants, but with dignity and confidence. The way of achievement in this case will not be without its rough places, but the prospects are encouraging and the goal is in sight. With "a steady pull, a strong pull, and a pull all together," the master builders of this country will not only recover lost ground but they will reach a point where they will exercise the balance of power,—to which, in view of the interests at stake, they are rightfully entitled.

Accuracy in Estimating

AT the last monthly meeting of the Montreal Branch of the Canadian Society of Civil Engineers, reported in the Contract Record and Engineering Review of February 21, there was some discussion concerning the matter of engineers' estimates. Mr. F. W. Cowie, Chief Engineer of the Montreal Harbor, dealt at some length with the tendency to under-estimate shown by present-day engineers. The practice was becoming universal, Mr. Cowie considered, and he urged that engineers should protect their reputation by providing for the various contingencies by the addition of a certain percentage. He held the opinion that engineers would be taken more often into higher councils if the public were convinced that their estimates were reliable. Another speaker who deplored the discrepancies between estimates and actual costs was Senator Casgrain. The president of the Canadian Society of Civil Engineers, Mr. W. F. Tye, held that in order to encourage progress engineers had to be optimistic and to submit the best figures they could. He was afraid that if the precise figures of what work would cost were given, many railways, for instance, would not be built.

For our own part, we are heartily in accord with those who advocate greater accuracy in all phases of engineering work. The optimism that is misleading and that is based on false figures is little short of a crime on the part of those who are responsible. Take, for instance, the case of an engineer who reports upon a mining property. Some would call it optimism to build up the possibilities of the existence of many wonderful rich veins upon a little streak that would hardly pay to uncover. Others would call it misrepresentation. Yet others would call it a fraud, particularly if they had been induced to invest money in the undertaking.

Of course we know perfectly well that President Tye does not mean this kind of optimism, but we make the extreme argument in order to justify our objection to the term "optimism" in the preparation of the engineer's estimate. Both optimism and pessimism are dangerous, and there are spheres into which neither should enter. The subject is commented upon at some length in a recent issue of Engineering & Contracting. "It has been admitted by engineers," says our contemporary, "that nothing, save dishonesty, will so surely and quickly injure the reputation of an engineer as habitual inaccuracy. This refers, we take it, to the mistakes made in measuring, computing and designing. Employers of engineers insist that the same statement holds good with reference to the accuracy of engineers' estimates of cost. This is especially true of capitalists, as the following quotations will show:

'I think as I look back on the task of enlisting capital for this enterprise, the fact that stands out the worst in the whole experience is the amount of bitter feeling there is in the minds of capitalists all over the world against the engineering profession; and this bitter feeling, in almost every case that I encountered, was justified by facts. Time after time it has come out that engineers' estimates were nothing more or less than mere guesses, and 100 per cent. of error is as common as fleas on dogs.'

"The quotation made was first published in the columns of a contemporary engineering journal, about a year ago. It was published without editorial comment except the statement contained in the caption that the quotation was from a personal letter to the editor from a well-known engineer. We repeat it here at this time because it is a concise statement of a condition which we frequently have heard engineers discuss.

"It is not believed that there is a world-wide lack of confidence in engineers' estimates, but certainly there is sufficient lack of confidence, on the part of capitalists and the public to warrant some consideration of the subject by engineers.

"It is believed that estimates are far more accurate now than they were forty years ago. In earlier times engineers were more often concerned with finding a way to do a piece of work than in accurately estimating its cost. Now it is taken for granted, by the general public at least, that engineers can do anything conceivable in the way of construction—engineering and contracting being, of course, perfectly blended in the popular mind. The engineering achievements of to-day often excite greater wonder and admiration in the minds of engineers, who appreciate the difficulties overcome, than in the minds of laymen who have grown accustomed to continued engineering success and therefore take everything accomplished by the engineer as a matter of course. The engineering feat has survived only in the inexpressive, stereotyped, newspaper head-line.

"This condition, as we have said, reflects the uniform success of engineering enterprises and really constitutes the highest tribute the profession could hope to receive. Since good engineering results are now more positive and engineering methods more precise than formerly, the engineer has found time somewhat to improve the accuracy of his estimates of cost. That there still is room for improvement hardly will be denied.

"Much of the criticism which has been made of estimates has been directed at rough preliminary estimates based on insufficient data. In many cases such estimates are necessary, and the engineer will do well to impress on the minds of his client that the figures given are necessarily only roughly approximate. Unfortunately a direct statement to that effect seldom keeps the client from tenaciously clinging to the rough figures given. When detailed information is secured and an accurate estimate made no adverse criticism is likely to be made if the original estimate was too high. We need not comment on the opposite condition.

"Some engineers point to the lawyer and mention his unwillingness to give an opinion until he has read the law, and suggest that engineers adopt a similar position and refuse to give rough estimates of cost. Preliminary estimates cannot be avoided in all cases, but, where possible, engineers will do well to avoid making them.

"The detailed study of costs will enable engineers to improve the accuracy of their estimates. If all engineers would co-operate in the effort to collect and publish complete cost data, fully describing the methods employed on the work, the grade of labor employed, the hours worked, the conditions of soil, weather, etc., which influenced the costs, the profession soon would be able to make far more accurate estimates of cost than at present. The engineer would then enjoy the complete confidence of his client and the public."

Bonuses to Contractors' Employees

THE subject of paying contractors' employees a salary and a bonus for extra work done is discussed at some length by our Chicago contemporary, The Contractor. Few contractors use this system for laborers and mechanics, but quite a large number of contractors do pay some of their foremen and especially superintendents and general managers a bonus on the work they get done. This is a good practice, but as followed by some contractors there are objections to it and these, unless properly handled, will bring the bonus method into disrepute.

One objection is, that in hiring a superintendent, an agreement is made to pay him so much salary and a certain per cent. of the profits. The idea is to spur him to make a large profit on the job. The salary is paid weekly or monthly, but the bonus cannot be paid until the job is finished, for should the job last, say eighteen months, the first and second six months might show a large profit, which might be eaten up in finishing the work during the last six months, so that if bonuses were paid as the job progressed the superintendent might be overpaid according to the agreement. Then a man so employed cannot be readily discharged, for he can always claim, no matter how incompetent he is, that if allowed to finish the job, that he would have earned a handsome profit. This means in many cases a law suit.

All of this trouble can be overcome by making the proper agreement in writing, setting forth on what basis the profit is to be figured, and the percentage to be paid the superintendent and how the agreement can be terminated if one or both parties wish to do this. Although written agreements are made, they are seldom specific enough, and in making them the parties, as a rule, do not anticipate trouble.

Another objection to paying a superintendent a bonus on the work he does can be illustrated by an example that occurred recently with an eastern contracting company. The work was submarine rock excavation. The rock was drilled and shot during the winter and dredged during the summer. Under the superintendent rapid progress was made on the drilling and blasting and he earned considerable bonus on this part of the work. When the dredging was done the following summer it was found that at many places the rock had never been drilled or blasted, and thus the bonus had never been really earned. An investigation of this man's work was made and it was also found out that he had a system of making the men under him pay him a per cent. of their wages.

This superintendent was dishonest and dishonesty is always difficult to deal with, but men, with the proper system of reports and inspection can be prevented from doing dishonest acts or apprehended in them at the start. This firm was partly to blame. It was robbed and allowed its men to be robbed, because it lacked the proper system of inspection. It is surprising how many large contracting companies are robbed and also allow their men to be robbed. The writer is informed that one company operating in the east that has about one hundred teams, has a man in charge of them who has for several years made every teamster he employs pay him ten dollars to obtain the job, and five dollars monthly in order to hold his position. This man, if he does not share this graft with others, is getting rich, and the contractor is losing money by it. First, men are not hired because they are competent teamsters, but because they will pay the graft, and after being employed they are bound to be independent and do as they please, never considering the interests of the contractor, for they are paying to hold their jobs. A man in charge of men should never be allowed to have any money dealings with them, not even to borrow money from them or make loans to the men, nor should foremen be allowed to keep time, for debts can be paid with time allowances.

Another instance of handling the bonus system improperly is that of a contracting company employing a superintendent at a salary of five thousand dollars a year and agreeing to pay him a bonus on all work he had done over a certain amount. This man, by good management, so handled his work that in fifteen months the extra work done netted him fifteen thousand dollars, that is he did so much extra work with the same labor and machinery that he earned for his company extra money, thus decreasing the overhead charges per unit and made for himself a thousand dollars each month. When this was reported to the board of directors they voted at once to cut out all bonuses.

Nothing could have been more detrimental to their own interests than such an action. Their men at once realized that their employers would not act in good faith with them and they were killing the goose that laid the golden eggs for themselves. The job should have continued to the end on the same basis, then if it was not an equitable one for all concerned a new basis for a bonus could have been set for the next job.

One advantage that contract work has over ordinary manufacturing, in adapting the bonus system to it, is that each job can be put on a different basis, using the experience gained on the former jobs, without creating discord and dissatisfaction among the men. In manufacturing, work goes on continuously and whenever a new basis of pay is given the main trouble occurs, and thus often leads to strikes.

Employers should always realize a fair profit on their work, but they should at the same time be ready to share with their men extra profit that they earn. The bonus system makes men think and put out extra efforts to increase their output, and in doing this machinery is given better care, and all the interests of the employer are better served. Contractors should give all of these things mature reflection.

Honor to whom Honor

Alfred S. Johnson, Ph.D., graduate of the University of Toronto, and now Editor of the Cement World, writing us anent the claim that the late Isaac Charles Johnson, of Gravesend, Eng., was the inventor of Portland cement, offers considerable evidence to show that the first mill erected for the manufacture of cement produced from an artificial mixture of calcareous and argillaceous raw materials—in other words, Portland cement—was built by Joseph Aspdin, of Wakefield, Eng. It is said that Mr. Aspdin obtained the patent for his invention in 1824 when Isaac Johnson was a boy of thirteen. "Joseph Aspdin," says the writer in question, "needs no monument. His sufficient monument is the great industry to which he gave the original stimulus—an industry which is teaching the world a new lesson of structural and hygienic regeneration, and which will lay all future generations of mankind under the tribute of indebtedness."

The Oldest Portland Cement Plant in the World.—Built at Wakefield, Eng., about 1830 by Joseph Aspdin

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Among the many useful minerals recently discovered in the vicinity of Richmond, Vancouver, were vast deposits of diatomaceous earth, which have so far not been utilized. The chief use of this earth is for cleaning and polishing, either in the form of powder or mixed with soap. It is an effective non-conductor of heat, and has been used alone or with various compounds for coverings for boilers, steam-pipes, and safes, and in fireproof cement. Its great absorbent qualities fit it admirably for use in water filters and for dynamite. For the latter use it is mixed with wood pulp. It is used largely by paint manufacturers as a wood filler. Boiled with shellac it is made into records for talking machines. In Germany it has been used for the absorption of liquid manures, so that they could be utilized as fertilizers, as a source of silica in making water glass, in the manufacture of cement, tile glazing, artificial stone, ultramarine and other pigments of aniline and alizarine colors, paper filling, sealing wax, fireworks, hard rubber objects, matches, and papier-mache, for solidifying bromine, and for many other purposes.

National Builders' Convention in Toronto

Proceedings of the Sixth Annual Meeting of the C. N. A. B. Winnipeg Man New President—Calgary Delegates Successful

BUILDERS and contractors from all parts of Canada, representing the Builders' Exchanges of the country—from Quebec in the east to Calgary and Edmonton in the west—were present last week in Toronto at the Sixth Annual Convention of the Canadian National Association of Builders' Exchanges. In previous numbers of this journal we have described the work and aims of this Association in detail and it would be superfluous to enter into these matters. In general, however, and before detailing the proceedings of the convention we cannot refrain from commenting upon the representative nature of the attendance, the excellence of the addresses as well as of the ensuing discussions, and the far-reaching importance of the business transacted.

The convention proper opened on the morning of Wednesday, February 21, shortly after ten o'clock. The members adjourned to attend the civic reception by Mayor Geary in the Council Chamber of the City Hall. His Worship extended a brief but cordial welcome to the visiting delegates and a reply was made by the president, Mr. E. T. Nesbitt, of Quebec. The members re-assembled at the convention headquarters, the Builders' Exchange, at 11.30. The President was in the chair and opened the proceedings with an interesting address. Mr. Nesbitt was able to report a most successful year. He dealt at some length with the work of the Association and emphasized the benefits to be derived from a convention of this kind, which brought together delegates from all parts of the Dominion and afforded them the opportunity to discuss trade topics, to interchange ideas and generally to place the building industry upon a surer footing. The Canadian building industry was a great one, a fact which was emphasized by a building expenditure last year of $150,000,000. Some interesting remarks followed by Mr. Geo. Gander (Toronto), provincial vice-president for Ontario, who congratulated the Builders' Exchange of the city of London upon the energetic way in which they had devoted themselves to organizing new exchanges in their district. The speaker described the steps that had been taken with a view to forming a provincial association.

LEGISLATION IN ONTARIO

Continuing, Mr. Gander said:

"In Toronto we are very close to the Ontario Government. I might say that we have put forth a little influence in watching what would be towards our benefit at the local House. Very early in the session there was a request made that the Ontario Government should frame what they call a new Scaffolding By-law. There is one on the statute books of Ontario at the present time, but the labor people asked for something of greater importance. Half a dozen labor people came along and each man had a different definition of what kind of a scaffold he would like. They did not seem to agree upon what would do for the painter, carpenter or iron man. They had no concerted plan. The measure was placed before the Commissioners and as far as the cities were concerned, especially Toronto, we had a scaffolding by-law, under the direction of the City Council, and it was being looked after as far as possible. We showed them that it was an expensive affair and that it would cost even more to carry it out throughout the country. The government came to the conclusion that they would have to have an inspector in every town to look after a certain district or mileage. The expense was so great and the scaffolding ideas were so varied that they found that, outside Toronto and one or two big cities, there would be no use in taking it up. The question proved cumbersome even to the labor delegates and they let it die without any more protest.

"Another thing that has come before the local House is the Compensation Act. We shall have a gentleman with us to-morrow who will exemplify the case in a very good way, and if you feel like asking him any questions he will be pleased to answer them, and I am quite sure that anything you may have to suggest to him along the lines of compensation he could put before the Commissioner and would be glad to do it.

"We thought of the Bill that was framed up by the Employers' Association, and we saw no reason why we should not combine in the matter as our views coincided with the proposition they had. We were perfectly willing that the Bill should be carried. I might say that there were quite a number of meetings, and if you think that the labor people were not alive to the fact it is a mistake on your part. If there were five of us present there were fifteen of them. I often wondered how the labor unions could afford to have so many delegates in attendance day after day. It may pay them to look after their interests in that way. They were alive to the fact that something good would come out of this and were very watchful of their own interests.

"I might tell you one thing: I honestly believe that, to some extent, the Commissioner was rather in sympathy with the labor element when he started. He persuaded us very strongly to take home for careful perusal a copy of the Washington Act and also a copy of the British Act, both formed for the benefit of the working classes. He asked us to come to the next meeting and tell him what we thought would be for the good of the trade, so as to help the Commissioner in working out the problem. We did not bring up anything, but simply stuck to our original idea. The labor people, however, kindly went through both copies, and brought in a delightful proposition next morning. The Commissioner listened and then said: "Gentlemen, before you go any further, I should like to know if you have missed anything at all you would like to have said?" They answered "No." "Then," he said, "I am very, very sorry; I really thought that you people would be more fair in your ideas when I gave you the opportunity of bringing us something sensible. I have come to the conclusion that you have gone to the extreme in looking after yourself and not after the other man at all." I think the Commissioner regarded us with favor after that, and I believe the Bill he will bring forth will be a benefit to the working classes as well as to the employers. What will be the outcome

I cannot say. We feel that this Bill coming through in a decent form will be of benefit to us and put us in a better position than at the present time. We wish to get away from fighting and lawyer troubles. You understood the working man does not want to put up a copper towards compensation. All the expense has to be borne by the employers and perhaps the Government.

"The labor people wished to have a clause inserted that in case they were not satisfied with what the Compensation Committee awarded, and even after that was supposed to be final, they should still have recourse to common law!

"This Exchange has been spurred up to the idea of getting a contract that will be satisfactory to both the architects and ourselves. We have got through our portion of the Act, and Mr. Garvey, the Chairman of that Committee, will lay it before the architects, after which it will be framed up in some way that I hope will be satisfactory to all parties."

Mr. Gander's report was referred to the Committee on Resolutions.

NOTEWORTHY SUCCESS IN MANITOBA

The next report came from Mr. Fred. H. Davidson, Provincial Vice-President for Manitoba, who stated that he had just received word of the formation of a new exchange at Prince Albert. In all probability, he said, this association would become part of the new Provincial Exchange now being organized in Saskatchewan after the manner of the Alberta and Ontario Exchanges. This system of provincial organization gave the Canadian builder the sure means of working out his own salvation and the maximum good was accomplished when the provincial bodies were in turn controlled and governed by an efficient national organization. Mr. Davidson continued that the most notable achievement of the Winnipeg Exchange had been the adoption of a uniform tariff, which was working to perfection. In round figures the Exchange had expended something like $5,000 in getting this contract perfected. They had started out with a contract which they had thought uniform but which they had discovered to be most defective. The defects had been shown in two great law suits in which the defence was conducted by a celebrated Winnipeg lawyer who had revised the contract and presented it in a safe and reliable form. At the present time the building trade in Winnipeg was endeavoring to have the city and School Board adopt the uniform contract in all their work. The amount of money spent in litigation had diminished considerably since the uniform contract had been revised in its present form. A notable work they had accomplished was the formation of an association which had been organized within the Winnipeg Builders' Exchange and which existed primarily for insurance purposes. During the last year the members had carried their own insurance, settled their claims quickly, and made and saved a great deal of money by it.

In reply to a member Mr. Davidson said that they had not been required to take out a provincial charter. They had worked simply as a mutually protective association.

ACTIVITY IN ALBERTA

Mr. R. A. Brocklebank, President of the Calgary Builders' Exchange, submitted a report for the province of Alberta for the year 1911. Shortly after the convention in Winnipeg last year Mr. Brocklebank visited Medicine Hat and succeeded in organizing the Builders' Exchange in that city. Later, a Provincial Association was formed in Alberta, this body consisting of the Exchanges from Edmonton, Lethbridge, Medicine Hat and Calgary. One of their aims was to secure a provincial uniform contract, similar to the one in use by the Winnipeg Builders' Exchange. From the impressions received at the convention of the Provincial Association of Architects held last month at Calgary he felt that there was every prospect of their obtaining the desired uniform contract within a month. The architects appeared to be in perfect accord with the stand taken by the Provincial Association of Builders.

"Another matter taken up," said Mr. Brocklebank, "was in connection with the present lien law in the Province of Alberta. We are supposed to have a form of lien law which is a protection to the sub-contractor and the supply dealer, but when we investigate we find that if the owner or the contractor wants to play into the other's hands it is an easy matter to shut out the dealer and the sub-contractor. I might say that the wages of the laborer are fully protected. He has the power to place a lien upon any building throughout the province for six weeks' labor. It makes no difference how much the owner has paid out on that contract; he is still liable for wages for six weeks for the workman, if proceedings are taken under the Lien Act. On the other hand, if the owner should let a contract at a very low figure, the men who do the first work—such as excavating, stone work, etc.,—are probably paid, but about the time the painter, plumber and such men come along there is no money for them when they want to settle up.

"A deputation of us went to Edmonton and laid our complaint before the Provincial Government. We had not the pleasure of seeing the Premier, but we met the Attorney-General, Provincial Secretary and Minister of Agriculture, besides private members. We went into the matter very carefully. They were not at all inclined to listen at first, but after we had laid our case before them and showed our draft of a lien law that we wished the government to pass, they consented to meet us again and we went into the matter more fully. Finally the Attorney-General sent us to the Deputy Attorney-General to have the draft Lien Act prepared for the Legislature. We were up about December 1st. The Legislature adjourned on December 23rd and re-assembled about January 24th or 25th. They adjourned the day we left, but a few days previously we had a notification from the Attorney-General stating that owing to the pressure of business they were unable to attend to the matter at the present session, but that they would be able to take up the Lien Act for the Province at the next session."

UNIFORM CONTRACT FOR MONTREAL

A report for the Province of Quebec was made by Mr. W. A. Ramsay, of Montreal, who said that in Quebec very little was being done outside of the city of Montreal. In both Quebec city and in Montreal there were good live institutions, but with the exception of these and St. Hyacinthe, and possibly Sherbrooke, there was no possibility of starting branch associations. Mr. Ramsay referred to the part taken in legislative matters by the Montreal Exchange, and alluded to the work accomplished in the matter of obtaining a uniform contract. The Architects' Association of the province had passed resolutions in favor of the uniform contract and there was no doubt that before the end of six months it would be an established institution in at least Montreal.

President Nesbitt thanked the delegates for their reports and paid a tribute to the importance of the work in hand and the advantage of being able to ascertain at one meeting exactly what was being done in all sections of the country.

The minutes of the last Annual Convention were presented by Mr. J. H. Lauer and adopted.

At the opening of the Wednesday afternoon session a few remarks were given by Mr. Somerville, President of the Hamilton Builders' Exchange, who foreshadowed the possibility of that body becoming a part of the C. N. A. B. at no distant date. Mr. Somerville said that the greatest benefit would be derived from pulling together. Too many builders were at daggers drawn with their competitor. These remarks were supplemented by a few observations from Mr. Heatley, Secretary of the Hamilton Builders' Exchange, who expressed a friendly disposition for the architects but condemned their form of contract as "an absolute trap." Mr. Heatley remarked humorously that he felt rather nervous about expressing his opinions "so far from home"—especially in Toronto, which had become famous for its great dinners! There was one point, however, upon which he would make a venture, and that was insurance, to which reference had already been made by Mr. Davidson, of Winnipeg. He felt that he must endorse the suggestion that the trade get together and organize its own insurance. Personally he had to spend several hundred dollars a year in insurance although his workmen had never had an accident. He hoped the C. N. A. B. would take up the question so that the master builders would obtain the benefits that were now going to the insurance companies. Mr. Heatley concluded by a final reference to the contract. Too often the specifications and plans did not coincide and the contractor had to bear the consequence of the architect's omissions.

WORK AND AIMS OF THE ASSOCIATION

Interesting details concerning the work of the association were given by the secretary-treasurer, Mr. J. H. Lauer, of Montreal, who showed the progress that had been made since the organization of the body in Toronto six years ago. Mr. Lauer noted with pleasure that delegates from Hamilton were present for the first time. An exchange had recently been formed at St. John, N.B., and it was hoped that this would become affiliated with the national association. The builders of Canada were becoming organized upon an excellent system. The value of the amalgamation of the local exchanges into provincial associations under the direction of the C. N. A. B. could not be over-estimated, particularly in view of the varying legislation obtaining in the various provinces. Mr. Lauer expressed himself as being strongly in favor of petitioning the Dominion Government to frame a model Workmen's Compensation Act and Lien Law for the benefit of the provinces. He urged that an aggressive part should be taken by the association in all matters affecting the interests of the master builder. "It is the wheel that creaks the loudest," said Mr. Lauer, "that gets the most grease." Mr. Lauer went on to speak of the builder's relations with the architect and of the need for uniformity in contracts. Forms were frequently signed without a proper realization of the conditions, but there was always the risk of the full pound of flesh being exacted. The labor bodies were still as active as ever. Only last month in the province of Quebec they had petitioned the Legislature to raise the amount of compensation for injured workmen from $2,000 to $3,000. They had received no encouragement, however, thanks to the effective organization of the master builders.

TECHNICAL TRAINING

One of the features of the Wednesday sessions was a talk on Technical Training, given by Dr. A. C. McKay, Principal of the Technical School of Toronto.

In the course of an interesting and comprehensive address, Principal McKay outlined the scope and aims of the two great branches of education:—general or cultural, and technical or vocational, pointing out that a generation ago the chief emphasis was laid on the former, while to-day the popular idea of education centred in the latter.

Canada's Educational System

After enlarging on the characteristics and advantages of these two branches the speaker went on to divide the workers of the country into four classes—professional, commercial, agricultural and industrial. Viewing them as a whole, he opined that the professional man took most delight and evinced the keenest interest in his work, because he made the most deliberate choice of his calling and received the most elaborate training for it. Canada spent a large sum on education, the greater part of which was expended on the equipment of professional men, who formed only four per cent. of the total workers.

He considered that Canada's educational system compared favorably with that of any other nation, but at present it required expansion and development on the technical side, as the crying need of the country was efficient workers. Ontario has shown a splendid example in her Agricultural College, famed the world over, and in Toronto the technical training problem was being attacked with enthusiasm and thoroughness. He spoke with admiration of Germany's provision for technical training, where in Munich, a city of similar size to Toronto, some seventy different trades were taught, while in Berlin, a much bigger city, of course, instruction was given in about two hundred different branches of industry.

The Problem of the Boy

Warming to his theme, the speaker stated that he would deal with the matter from the standpoint of the average boy, to whom the ordinary school course became irksome about the age of fourteen. Thousands of boys left school too soon because they felt school life a burden. Experiencing no difficulty in securing menial work at a small wage they started prematurely to earn their own living, discovering three or four years later that they lacked the capacity to earn good money through want of special training. Thus they awoke to the painful fact that they had wasted some of the best years of life. Such cases, said Principal McKay, were frequent among the applicants for admission to the Toronto Technical High School.

The solution of the difficulty lay in combining the practical and the theoretical in the school curriculum, thus making school life attractive to the boy and providing an outlet for his abundant energy and constructive faculty. The boy prefers the concrete to the abstract. He is more interested in things than in the thoughts behind them. Hence the best way to capture his enthusiasm and harness his powers is to set him to make and handle things for himself, in which process he is called upon to use in a practical way much of the knowledge gained in the more general part of his education.

The Ideal Technical School

Principal McKay then proceeded to outline the ideal technical training system, as embodied in the scheme proposed for Toronto. In this the general or cultural side of education would have due attention, half of the time being devoted to it. The technical or vocational would have equal attention, instruction in the various trades being given by the best practical teachers obtainable. The scheme would include a half timer's school, where instruction would be given to pupils spending half of their time in actual work under employers; as well as evening classes for apprentices, improvers, and others who wished to utilize their leisure by acquiring additional knowledge. At this point the speaker outlined roughly the work done in the present Toronto Technical High School.

Evidences of the Existing Need

The proposed scheme comprised several branch buildings scattered over the city, with a large central building, a leading feature of which would be a spacious hall, where buildings or parts of buildings would be erected. Dwelling on the need for the provision of such training in connection with the building and allied trades, Principal McKay asked how many carpenters could construct a spiral staircase or an elaborate roof. A member of the Educational Commission, investigating these two points in particular during the course of a tour, was surprised at the small number in the building trade who could confidently tackle the two pieces of construction named.

In conclusion, the Principal declared that practical support was essential to the progress of the movement for better technical training. In Toronto the work of the Technical Education Department was encouraged and assisted by the Board of Trade, The Manufacturers' Association, and the various labor organizations. He hoped that employers would spare neither sympathetic effort nor generous giving in the interest of this great cause.

On Wednesday evening an enjoyable smoker was held at the St. Charles Hotel. The proceedings were almost entirely of a social character, the only departure being a short talk on Business Methods, by Mr. H. J. Daly. The evening was enlivened by a number of excellent entertainments. The committee responsible for the details of the evening were Messrs. W. Britnell, Frank Ryan, James Monroe, E. Curry and M. Moore.

THE TOWN PLANNING MOVEMENT

The Thursday morning session was given over to an interesting lantern lecture on Town Planning, by Mr. J. P. Hynes, architect, Toronto, who explained some of the fundamentals to be considered in laying out the modern city, and exemplified his remarks by commenting upon notable work accomplished in Great Britain and certain other European countries. The Garden City movement had stirred up a great deal of interest on this side and it was hoped that by united effort much would be accomplished in Canada. Some of the worst examples of blundering in the city planning were provided by Toronto, which showed up disadvantageously as compared with Winnipeg. Prince Rupert was about the first Canadian city to be built according to an intelligent plan. "The people of America," said Mr. Hynes, "are apt to think that they have all the money, but to those who are interested in town planning this seems ridiculous in view of the enormous expenditures that are made on the other side of the Atlantic."

The closing session of the convention was held on the afternoon of February 22, when an illuminating address on Workmen's Compensation for Injuries was given by Mr. F. W. Wegenast, Toronto, Secretary of the Legal Department of the Canadian Manufacturers' Association. The text of Mr. Wegenast's remarks will be published in the next issue of the Contract Record and Engineering Review. A number of important resolutions were submitted and adopted. These are given in full below.

THE RESOLUTIONS

Proposed by Mr. C. R. Frost (Edmonton), seconded by Mr. L. H. Martyn (London), and resolved: that this Canadian National Association of Builders' Exchanges in convention assembled in the city of Toronto, February 20-22, 1912, desires to express its appreciation of the courtesy extended by His Worship, Mayor Geary, in extending an official welcome to its delegates at the City Hall.

Proposed by Mr. L. H. Martyn (London), seconded by Mr. J. W. Morley (Winnipeg), and resolved: that the Canadian National Association of Builders' Exchanges assembled in its sixth annual convention in the city of Toronto, February 20-22, 1912, again confirms the resolutions already adopted in former annual conventions held in the cities of Ottawa, London and Winnipeg, respectfully requesting the Hon. the Minister of Labor in Ottawa to enlarge the scope of the Industrial Disputes Act, 1910, so as to include the building trades. Furthermore, as the penal clauses therein contained have for their object the prevention of strikes and lockouts and are of the essence of the Industrial Disputes Act, that in the best interests of both employers and employees no legislation be accepted by the Department of Labor which would tend to weaken the practical value of said Act.

Proposed by Mr. Geo. Gander (President, Toronto), seconded by Mr. R. A. Brocklebank (Calgary), and resolved: that the Department of Militia, and Marine & Fisheries in Ottawa be respectfully requested to furnish plans and specifications of such public works as are proposed to be executed in the vicinity of any of the principal Builders' Exchanges which may be deemed to be the centre of such particular district, in accordance with the practice already courteously conceded to this association by the Departments of Public Works and Railways & Canals.

Proposed by Mr. G. Silvester (Calgary), seconded by Mr. E. R. Dennis (London), and resolved: that the secretary be instructed to proceed with the application to the Secretary of State for registration of the Canadian National Association of Builders' Exchanges under the Trades Union Act, 35 Vict., ch. 131, as an Industrial Union of Employers.

Proposed by Mr. W. J. Davidson (Winnipeg), seconded by Mr. R. A. Brocklebank (Calgary), and resolved: that in view of the unsatisfactory character of the various Provincial Lien Acts as a satisfactory security to the sub-contractor and the suppliers of materials, the Department of Trade and Commerce, Ottawa, be respectfully requested to draft a federal act with concurrent provincial legislation, to ensure uniformity of practice.

Proposed by Mr. Geo. Gander (Toronto), seconded by Mr. R. A. Brocklebank (Calgary), and resolved: that this convention particularly urge upon affiliated provincial associations, as well as individual exchanges, the early preparation and adoption of a "uniform" form of contract between provincial architects' associations and builders, as the recognized contract to be accepted and enforced by members of constitutent exchanges.

Proposed by Mr. W. E. Ramsay (Montreal), seconded by Mr. C. R. Frost (Edmonton), and resolved: that while this sixth annual convention of Canadian National Association of Builders' Exchanges held in the city of Toronto, February 20-22, 1912, desires to express sincere congratulations and appreciation to the various provincial governments for their splendid public spirit in the establishment and endowment of technical schools, it respectfully recommends the inclusion in such institutions of practical trade schools by the provision of industrial classes.

Proposed by L. H. Martyn (London), seconded by Mr. C. R. Frost (Edmonton), and resolved: that the assessment per capita for the ensuing year 1912 until date of next convention be and hereby is fixed at the sum of 75 cents per member of each local exchange; such assessment to be due and payable in three instalments of 25 cents each, the first whereof shall be payable upon adjournment of the present convention, the balance at four and eight months from date.

Proposed by Mr. G. Silvester (Calgary), seconded by Mr. J. W. Morley (Winnipeg), and resolved: that the thanks of this convention be tendered to the press and in particular to the trade journals for their able support in the publicity generously accorded to the Canadian National Association of Builders' Convention.

Proposed by Mr. Geo. Crain (Ottawa), seconded by Mr. C. R. Frost (Edmonton), and resolved: that a very hearty vote of thanks be and hereby is tendered to the president, officers and secretary of The Toronto Builders' Exchange for their splendid hospitality and their excellent and generous entertainment as hosts to the sixth convention.

THE NEW OFFICERS

The election of officers resulted as follows: President, Mr. J. W. Morley, Winnipeg; vice-president, Mr. Geo. Gander, Toronto. Provincial vice-presidents: Alberta, Mr. C. R. Frost, Edmonton; Saskatchewan, Mr. Robt. J. Lecky, Regina; Manitoba, Mr. W. J. Davidson, Winnipeg; Ontario, Mr. Geo. S. Gould, London; Quebec, Mr. John Quinlan, Montreal. Directors representing exchanges: Edmonton, Mr. C. C. Batson; Calgary, Mr. G. Silvester; Lethbridge, Mr. C. E. Leader; Regina, Mr. W. A. Wilson; Winnipeg, Mr. Robt. Watson; London, Mr. Wm. Nutkins; St. Thomas, Mr. R. Sanders; Toronto, Mr. John Aldridge; Ottawa, Mr. A. J. Marshall; Montreal, Mr. Jas. Ballantyne; Quebec, Mr. J. L. Lachance, Secretary-Treasurer, Mr. J. H. Lauer, Montreal.

Calgary was decided upon as the meeting place for next year's convention. There was no opposition, the members having in mind, doubtless, the strong fight that had been made at Winnipeg last year by the Calgary delegates, who, after a tie, retired in favor of Toronto. The Mayor of Calgary, Mr. J. W. Mitchell, sent a very cordial invitation to the association stating that Calgary had every claim to be considered a good convention city and that they would do all in their power to make the seventh annual meeting a pronounced success.

PRESENTATION TO MR. E. T. NESBITT

One of the most emotional moments in the history of the association came with the retirement of Mr. E. T. Nesbitt from the office of president, which he has filled so ably and the duties of which he has discharged so faithfully during the last two years. On behalf of the association a magnificent solid silver tea set was presented to Mr. Nesbitt as a token of the regard and gratitude of the members. A further mark of esteem was in conferring upon Mr. Nesbitt the life rank of honorary president of the Canadian National Association of Builders' Exchanges. Mr. Nesbitt was entirely overcome by this recognition but thanked the association in a few well chosen words. It is perhaps not out of place for us to congratulate – not so much Mr. Nesbitt, as the association, upon its opportunity to recognize the self-sacrificing and zealous work accomplished by Mr. Nesbitt during the last two or three years. We should add, perhaps, that Mr. Nesbitt has a worthy successor in Mr. J. W. Morley, of Winnipeg, whose name is a synonym for painstaking and practical work,—which is the association's greatest need.

The visiting delegates remembered the effective work of Mr. Gander in arranging for their reception by making him the recipient of a handsome oak banqueting chair.

A MEMORABLE BANQUET

The annual banquet of the association was held at McConkey's restaurant on Thursday evening, February 22. There were present some two hundred and fifty members and their friends and the function passed off with the greatest success. The chairman of the evening was Mr. Arthur Dinnis, Toronto, and the toast-master, Mr. Fred. Armstrong, Toronto. Recitations and musical numbers were given by Messrs. Smily, Bembrose, Slack, etc. Throughout, the proceedings were enlivening and entertaining and there was a notable absence of long speeches. The hint was evidently taken from the toast-master, who, at an early stage, recalled the connection between brevity and wit.

In his opening remarks the chairman expressed gratification at the representative attendance at the convention and incidentally said a good word for Toronto as a convention city. In this respect, Mr. Dinnis said, Toronto was not second best to the Western Metropolis. The speaker told an amusing tale at the expense of Winnipeg. The only thing they wanted out there, he said, was a great lake—about the size of Lake Superior. It had occurred to a few enterprising spirits in Winnipeg that this advantage might be secured by putting in a pipe line from Lake Superior. When he, Mr. Dinnis, was told of the project he expressed the opinion that if the people of Winnipeg could suck as hard as they could "blow" the project would be successful. Seriously, he said, Toronto was a great city. Last year they had expended $35,000,000 in building work. The official record was $24,000,000; the difference, of course, was the builders' profit. In regard to the proposed contract form they should see to it that this was in every sense equitable as well as uniform. Mr. Dinnis concluded by a brief reference to the relations between the owner and the builder.

Mr. J. W. Morley, the new President of the Association, spoke of the rapid developments they had witnessed during the last few years and alluded to the importance of next year's convention at Calgary. Mr. E. T. Nesbitt reflected pleasurably upon the fact that the membership of the C. N. A. B. now numbered some 1,300 of the leading contractors and builders in Canada; he also touched upon one of the principal duties of the association, that of watching legislation, and congratulated the members upon the manner in which the proposed eight-hour law had been pigeon-holed. Mr. J. H. Lauer, the secretary-treasurer, spoke of the country's prosperity, which, he said, was shared equally by the east and the west. Emphasizing the value of organization Mr. Lauer urged the members of the association to make the principle of co-operation their chief concern. Mr. R. W. Wickson, on behalf of the architects, made a few humorous observations concerning the relationship between the builder and the architect. The latter, he said, would never make a success in the contracting business for the reason that he did not possess sufficient "nerve" to add his profit to an estimate.

Addresses were also given by Messrs. J. G. Merrick, P. L. Fraser and others.

The Convention closed with a meeting of the new executive on Friday morning.

Provincial Association Organized for Ontario

The plan to organize a provincial organization of builders in Ontario was consummated last week during the convention of the Canadian National Association of Builders' Exchanges. The association will be subsidiary to the parent body and will exist primarily, if not exclusively, for the purpose of seeing that the master builders' interests are safeguarded in the enactment of all new legislation. The president of the association is Mr. Geo. S. Gould, secretary of the London Builders' Exchange; 1st vice-president, Mr. G. A. Crain, Ottawa; 2nd vice-president, Mr. Geo. Gander, Toronto; secretary-treasurer, Mr. P. L. Fraser, Toronto. The remainder of the directorate is as follows: Mr. A. L. Jecks, Cobourg; Mr. W. Davidson, Toronto; Mr. A. Boehmer, Ottawa; Mr. Thos. Wright, London; Mr. R. Somerville, Hamilton, Mr. R. Sanders, St. Thomas; Mr. Bogue, Peterboro; Mr. J. L. Youngs, Stratford; Mr. Hadley, Chatham; Mr. Secord, Brantford.

Mr. Geo. S. Gould, London
President

Mr. Geo. A. Crain, Ottawa
1st Vice-President

Mr. Geo. Gander, Toronto
2nd Vice-President

OFFICERS OF ONTARIO'S NEW PROVINCIAL ASSOCIATION OF BUILDERS

The Constitution of the new body will be founded upon that of the New York State Association of Builders.

The longest concrete floor in the world is probably that of the recently completed Armour-Swift-Burlington Bridge across the Missouri River at Kansas City. This bridge is of unusual interest, as it is the longest riveted truss in the world. The contractors, by careful planning, were able to mix all the concrete with one mixer, which was stationed on the shore, with an extensive hoisting tower adjacent.

Cost of Fireproof Construction

Mr. Philip H. Bevier, C.E., addressing a society at Orange, N.J., on "Fire Proof Construction," says:

"At the present price of building material, fireproof construction can be erected at a cost not to exceed 10 or 15 per cent. more than non-fireproof, and when we consider that fireproof buildings deteriorate about one-ninth of 1 per cent. per year as compared to 4 per cent. for ordinary buildings, that they rent better and that money can be borrowed on them on better terms, that they are vermin-proof, cooler in summer and warmer in winter, it would certainly seem part of wisdom and self-interest to adopt a better method in every case when the building is to be of a permanent character.

"When a man builds a house in the country, it may be that he has a right to jeopardize his own life and property and those of his family and gamble with the insurance companies, but there is no question that the owner of property in a city or town has no right to erect a structure which will be a menace to the safety of the adjacent property.

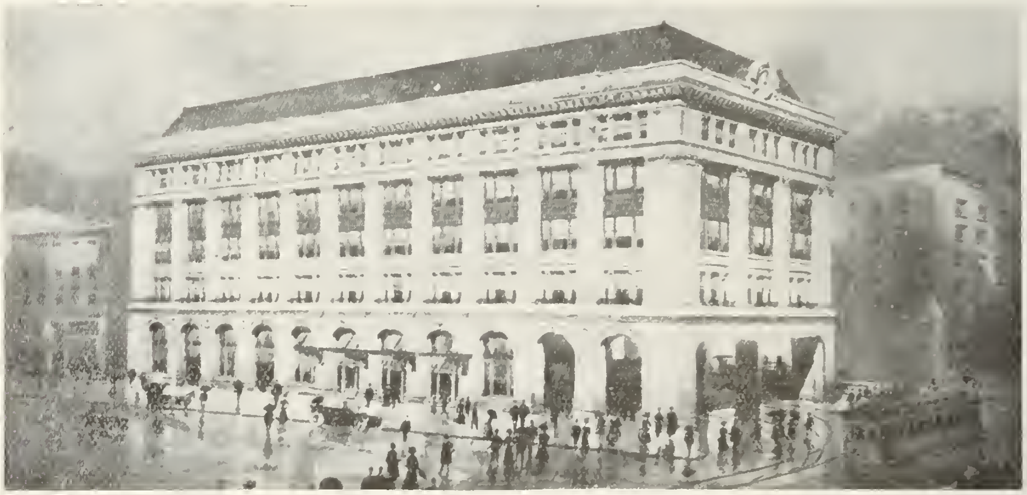
Reinforced concrete floors on some double-track bridges recently built have longitudinal joints between tracks. The engineers state that, when these joints are omitted, the local deflection when trains pass over one track produces stress in the concrete that cause cracks to appear in the structure. In some cases the concrete for the two tracks is laid independently, the two surfaces merely abutting at the joint. In others the joint is formed by some elastic medium placed between the two surfaces, thus giving a sliding joint. It is stated that with the latter construction a perceptible movement at the joint has been observed.

B.C.E.R. Office and Terminal Building

One of Vancouver's Most Up-to-date Structures — Reinforced Concrete and Fireproof Throughout — Treatment of Elevations

At an estimated cost of $420,000 the British Columbia Electric Railway Company, Limited, is now erecting in Vancouver, B.C., a handsome building which is designed to accommodate the head offices of the concern in Canada, as well as to serve for an interurban tram terminal for the extensive system operated by the company from Vancouver.

The location of the building is in the heart of the business district of Vancouver, at Carrall and Hastings streets. In 1898 the company purchased from the C. P. R. a plot of land on the corner of which was erected a two-storey brick building which then met the demands for head office and interurban station accommodation. When the great development of the company's business necessitated the securing of enlarged quarters a business block adjoining the old station on Carrall street was purchased and this site included in the building plans. Since the new structure was started the company has made further purchase of adjoining property, fronting on Pender St., which will permit of the further extension of its quarters as the need arises.



Head Office Building of the British Columbia Electric Railway Company, as it will appear upon completion.

The plot is very irregular in shape owing to the fact that the C. P. R. line, which crosses the city of Vancouver, extends in a diagonal direction along the west side of the tract. The building will have a frontage of 190 feet on Carrall street, 70 feet on Hastings street, 216 feet along the C. P. R. tracks, and 200 feet on the south side. From this south side connection can later be made with any extensions the company may plan for the Pender street property which it recently acquired.

Work on wrecking the old buildings on the plot was started on March 16 last and actual construction on the new structure was begun on June 29. Operations have been pressed vigorously since that date and the company expects to occupy the new quarters by midsummer of this year.

The block will be 80 feet in height from the ground, provision being made for a basement, high ground floor and five storeys for office purposes.

As will be seen from the illustration the building is of an imposing architectural type. In general it will be of reinforced concrete construction with a granite base on the ground level. On the Hastings, Carrall and C. P. R. frontages it is faced with wire cut light grey pressed brick, this face being relieved with rich ornamentation of terra cotta. Further ornamentation is given the street elevations by the placing of ornamental iron face plates on the structure, forming the sills and lintels of the windows. Over the pilasters of the ground floor is placed a heavy 4-inch belt course of terra cotta and above the level of the fourth storey is a heavy cornice, 5 ft. high and with a projection of 3 ft. for the illumination of the structure by powerful lights located in the cove of this cornice. In the basement, which will be 9 ft. 9 in. in height are located rooms for the trainmen, lavatories, heating plant and storage rooms.

The ground floor will be 24 ft. in height. On the Hastings street frontage provision is made for the interurban tram trackage leading to the large train shed on the west side of the building. Three entrances to this train platform are provided from Carrall street. The shed itself is 50 ft. by 128 feet in size. Its roof is formed on five heavy steel trusses in which girders 5 ft. 6 in. in depth and giving a span of over 50 feet are used. The office quarters are built over the Hastings street frontage of the train shed, but the greater part of the area is left clear above, being lighted through a roof of heavy wire glass.

The first, second and third storeys will be 12 feet high and the fourth and fifth storeys about 11 feet high. About 15,000 sq. ft. of floor space is provided on each of the office floors. Throughout, the structure is being built according to the highest standard of fireproof construction. The wood finish of the interior will be of oak. The plumbing is of the Durham type and the heating installation of the steam vacuum type.

The plans for the building were prepared by Messrs. Somervell & Putnam and the work of construction is being carried on by Messrs. McDonald & Wilson under the direction of Mr. R. W. Bridge who is acting as Inspector on the structure for the British Columbia Electric Railway Company.

Standard Working Drawings

A COMMITTEE report recently submitted to the British Concrete Institute embodied suggestions for the adoption of uniform standard practice in the making of working drawings for reinforced concrete constructions.

Drawings for reinforced concrete work should conform closely to general architectural practice. The standards found advisable for the preparation of drawings for reinforced concrete in architectural work will serve quite well for engineering work.

Scale.—It is recommended that the following are the best scales:

For general drawings, without detailing the reinforcement: ⅛-in. scale (1/16-in. scale to be substituted for ⅛-in. scale for large jobs).

For detail drawings, for framing plans and reinforcements, ⅛-in. scale; for elevation of beams, etc., and general detail drawings, ½-in. scale (¼-in. scale to be substituted for ½-in. scale for large members); for sections of beams, etc., 1½-in. scale; for large details of intricate work, 3-in. scale.

Thus we have, generally speaking, three scales—⅛-in., ½-in., and 1½-in. These three scales, it is suggested, are sufficiently elastic for ordinary work; and for very large jobs, smaller scales can be substituted as suggested above.

All dimensions should be figured on the plans, and nothing left to be scaled.

Standard Size Sheets.—It is suggested that the size of sheets upon which drawings are made be standardized. For general purposes two sizes are advocated—namely, 40 in. by 27 in., and 20 in. by 27 in. Larger sheets would be of the same depth, 27 in., but of greater length. These are measurements within the margin line, which later should be trimmed to this ruled upon the tracing cloth, and photographic prints should be trimmed to this ruled margin line. These sizes have been chosen for the reason that tracing cloth usually measures 29 in. to 30 in. wide, while photo-printing paper when trimmed is about 28 in. wide. The suggested standard sheets are therefore proportionate to the tracing cloth and to photo-printing paper. If a special marginal line is required on a photographic print, it should be drawn inside the ordinary marginal line referred to above, which line constitutes the full size of the sheet when trimmed.

Indicating the Reinforcement.—It is suggested that it will be found convenient generally on ½-in. scale drawings to show main bars by means of thick solid lines, secondary bars by lines of medium thickness, and the outlines of the concrete and other work by means of thin lines.

In ½-in. and 3-in. scale drawings, it will often be found advisable to show bars, when not of very small size, by means of double lines. The lines should, however, be strongly drawn.

Indicating Sections.—Many draughtsmen prefer to indicate the concrete by marks intended to show stones, as it is claimed that etching takes longer to do and requires great care to ensure the lines being placed regularly apart, without which the appearance is not good. There seems justice in this contention, and such marking for showing concrete is advised.

Reinforcement shown in section should always be blacked in. It is better to do this even on the largest drawings, because the drawings are made clearer thereby; and too much emphasis cannot be given to the reinforcements, as the drawings are specially intended to indicate them.

thing less than half full-size drawings.

Shading of bars should not be employed on any-

Stops to Ends of Lines.—In showing reinforcement on plans and elevations to ½-in. scale, it is necessary to employ some form of stop to the ends of each line to show where the ends of a bar terminate. As the ends of bars are manipulated in various ways, it is advisable to employ some form of shorthand to indicate the various kinds of ends, and the committee show methods of representing ordinary cut, fishtail, turned-over, and hooked ends, cranking, and wired junctions.

It is suggested that some standard list of abbreviations would not only save much time in draughtsmanship, but would be clearer in every way to everyone consulting the drawings, and such a list is put forward. Suggestions as to lettering and coloring are also detailed in the report, which will no doubt be published by the Institute.

Municipal Limitations on the Heights of Buildings

AN inquiry as to municipal limitations on the height of buildings in American cities was made by the Commission on City Planning of Hartford, Conn., a year or so ago. The results of the inquiry are given in the report of the Commission for the year ending Mar. 31, 1911, which has just been issued. Of 30 cities listed, 19 had no ordinance governing the height of buildings. The ordinance provisions of the 11 other cities, as abstracted or quoted in the report just named, are as follows:

Baltimore, Md.—No building more than 175 feet high except that towers, spires and belfries in fireproof buildings may extend to a greater height.

Boston, Mass.—No ordinance, but building laws provide the following: City divided into districts. District A, buildings of fireproof construction can be erected to a height of 125 ft., in another district the height of 100 ft., in a third, 80 ft., but the buildings in these latter districts are not of the same construction as District A.

Buffalo, N.Y.—"Outside of the fire limits of the city of Buffalo it shall be lawful to erect frame buildings not exceeding 50 ft. in height from the sidewalk to the highest point of roof."

Cleveland, Ohio.—"No building or other structure hereafter erected except a church spire, shot tower, water tower or smokestack, shall be of a height exceeding two and one-half times the width of the widest street upon which the building faces, but no building shall be over 200 ft. high."

Denver, Col.—"No building or structure to exceed 12 storeys excepting spires, towers, smokestacks, etc. All buildings or structures more than 125 ft. high, absolutely fireproof."

Los Angeles, Calif.—Fire district one story only and not over 16 ft. high.

Class A. All buildings upheld by masonry or reinforced concrete or framework of steel or iron. Fireproof or skeleton construction. No building over 150 ft. allowing 30 ft. for mansard roof—not more than seven storeys.

Class B. Masonry or masonry and steel, and iron or steel buildings, supporting iron or steel masonry.

Not over 100 ft. high nor more than eight storeys.

Class C. Masonry or reinforced concrete walls, floors not wholly carried by steel columns, and girders or reinforced concrete or masonry—85 ft. high, not more than six storeys exclusive of basements.

Class D. All buildings not included in A, B and C, 50 ft. high, not more than four storeys.

Louisville, Ky.—No nonfireproof building or structure outside the fire limits shall exceed 70 ft. in height, but this shall not apply to spires of churches or similar buildings outside of the fire limits which may be constructed of wood to a height of 125 ft. above curb level.

Portland, Ore.—

Class I. (absolutely fireproof), 12 storeys or 160 ft.

Class II. (fireproof, short span), 12 storeys or 160 ft.

Class III. (fireproof, long span), 10 storeys or 140 ft.

Class IV. (semi-fireproof), 6 storeys or 85 ft.

Class V. (mill construction), 6 storeys or 85 ft.

Class VI. (ordinary construction), 4 storeys or 60 ft.

Class VII. (frame construction), 3 storeys or 42 ft.

Providence, R.I.—No ordinance. Building law provides, "No nonfireproof building or structure hereafter erected should exceed 65 ft. in height."

"No fireproof (ordinary) building or structure hereafter erected shall exceed 120 ft. in height except that structures or appendages may be built upon roofs of said buildings not exceeding 20 ft. in height, provided that said structure or appendages shall be built of incombustible material throughout."

"Every building hereafter erected or altered to be used as a theatre or public station which exceeds three storeys or more than 40 ft. in height, shall be built fireproof (absolutely) except as hereinafter specified."

Rochester, N.Y.—No ordinance. Height regulated to conform to size and strength of foundations and construction of walls.

San Francisco, Calif.—Fireproof buildings, 102 ft.; semi-fireproof buildings from 55 to 86 ft.
being two cm. (0.8 in.) thick.

Iron filings and scraps mixed with mortar for cement floor finishes in stables and halls to make the floors less slippery have been used in quite a few cases. Some claim that iron filings added to the cement will increase the durability and strength of the floor, while others deny this and say that they merely make the surface rougher and prevent the floor from becoming slippery by long use. One of the arguments against this system is the fact that the wear and tear is not equally strong on all the parts of the surface and that, as a result, the sharp points and rough edges of the filings penetrate at some points and lead to injury. As regards the matter of slippery floors, it seems hardly necessary to have recourse to iron filings to prevent slipping, for cement floors give as a rule no reason for complaint in this direction. The filings, which are subject to the action of rust, give the floor, moreover, a dirty, ungainly appearance, and prevent its use in living rooms, though perhaps suitable enough for stables. Several German firms have constructed floors for stables and riding schools, using iron filings or else pulverized iron in the proportions one-half part filings to one part Portland cement to one and one-half parts sand, the floor finish being two cm. (0.8 in.) thick.

Proposed Specifications for Hollow Clay Tile Building Blocks

By Virgil G. Marani*

FOR several years the Building Department of the city of Cleveland, Ohio, has taken an active part in the subject of the use of hollow clay tile as a substitute for brick in the construction of load-bearing walls. As a result, the conviction has been forced upon the Department that the subject was worthy of careful and thorough investigation. In order to secure all possible data relating to the subject, exhaustive tests were made, by the Building Department direct and also by competent engineers acting in harmony with the Department, and in conjunction with one of its engineers, to determine the strength, stability, fire-resisting qualities, etc., of hollow building tile.

In the crushing tests, a large number of samples were gathered from different places; some from the yards of the manufacturers and some from the sites of buildings under process of erection. A complete range of quality of tile was thus secured and tests made to determine absorption and crushing strength. All tile tested were first carefully measured and a complete detailed record kept of each tile throughout the entire test.

Some of the tile were built up into columns of different dimensions and with tile laid in different positions in the various columns and then tested for crushing strength; other tile were tested singly. From the results of these tests it was found that 12 per cent. of their weight in moisture, with vertical webs spaced not more than 4 in. apart, center to center, and with web thicknesses at least 20 per cent. of height and blocks placed so that the vertical webs occurred directly over each other, no single tile or column failed under a less load than 3465 lb. per sq. in. of vertical web section.

Under the authority vested in the Inspector of Buildings by the Cleveland Building Code, the writer ordered a fire test to be made to determine if hollow tile, erected as a wall supporting a heavy uniformly distributed load, would satisfactorily stand the fire test prescribed by the Ordinance. A testing inclosure was built with 12-in. walls having outside dimensions of 9 ft. 6 in. by 10 ft. 3 in. by 8 ft. high, with a 3-in. coping of concrete on top. The entire top of the walls was loaded with an evenly distributed load of about 4066 lbs. per sq. ft.

The internal temperature developed was over 2000° F. at the upper pyrometer and 1600° F. at the lower; the outside wall surface remained cool throughout the entire test and showed no warping, settlement or cracking of any kind. After the water had been turned on and the fire quenched, it was found that the inside plaster had been burned off but the inside face of the hollow tile was true and no apparent damage evident. Later, the rear wall was further loaded to an evenly distributed load of 9487 lb. per sq. ft., without showing evidence of crushing, cracking or disintegration of any sort.

After thus determining the properties of hollow tile from tests, the next step taken by the Department was the framing of a suitable specification regulating the safe use of these tile for load-bearing walls and the revision of the building code relative to the subject.

It is evident to the writer that hollow tile can be safely used in the construction of load-bearing walls, only when proper specifications are followed. The specifications must treat them from the standpoint of their supporting webs and not as solid units. The tile must be hard burned. Vertical webs must be spaced not too far apart, and their thickness must be proportioned to their height. All vertical webs must stand in vertical alignment with vertical webs in adjacent tile below and there must be mortar between tiles under the vertical webs. The following specifications cover these points, amply safeguard the use of hollow tile for load-bearing wall construction and at the same time are readily complied with by builders and tile manufacturers:

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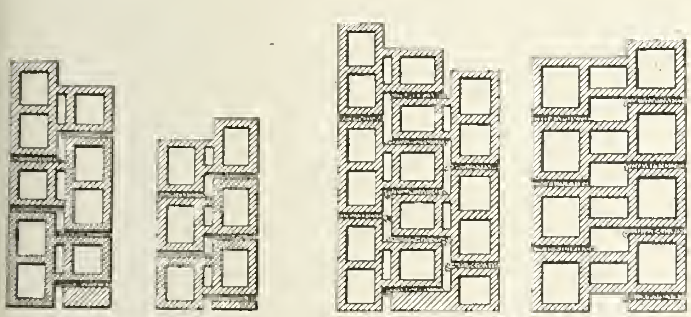
* Building Inspector, City of Cleveland.

The limiting of the width of beds that the tile are susceptible of is a most important feature. The mason cannot be relied upon to bed properly and thoroughly a large unit with a broad bed. The mortar is likely to be omitted from a portion of the bed and vertical webs be left without a supporting mortar bed. By limiting the width of the bed that the tile is susceptible of, to 4½ in. (width of common brick), a good bedding will be as certain as in common brickwork.

The accompanying cuts illustrate two forms of tile that are used in this market and which comply with the specifications herein proposed.

From the results of the experimenting the Department have done and the consideration given the subject, the writer recommends the following as the essential points to be covered, by building-law restrictions, in permitting the use of hollow clay tile for the construction of load-bearing walls:



Clay Tile which comply with building regulations.

Tentative Specification for Hollow Clay Tile

(1) Quality of tile: Tile to be made of shale or fireclay or any clay that will burn to a good dense body without undue warping or checking and must be burned to such a degree of hardness that they will not absorb more than 12 per cent. of their weight in moisture.

(2) Webs: Vertical webs should be spaced not more than 4 in. apart, c. to c., and should have a thickness of at least 20 per cent. of their height.

(3) Bedding: To secure thorough bedding, tile should be so constructed as to preclude mortar beds of more than 4½ in. (same as brick work) in width, and should be laid with broken joints, and be thoroughly bedded and bonded.

(4) Quality: Tile should be true and free from injurious checks and cracks.

(5) Position in Wall: Tile should be so laid in walls that all vertical webs are in vertical alignment with vertical webs of the adjacent tiles below.

(6) Loads: Hollow-tile walls should be loaded with not more than 200 lb. per sq. in. of vertical web section.

(7) Thickness of Walls: Permissible thickness of walls same as for common brick.

(8) Joist Bearing: Where joints or beams are seated in walls, they should have a bearing extending over at least two of the vertical webs.

It will be noticed that the above specifications only contemplate the use of hollow tile when laid with their voids horizontal. This has been done advisedly. The vertical type has been avoided not only from the standpoint of insufficient bedding and bonding, but also from economical considerations. In the first place the end of a tile web is too narrow (½ or ¾ in.) for the mason to apply a mortar bed in a practicable way and in the second place heat nonconductivity is defeated in walls where the voids of the tiles are vertical. In order to secure nonconducticity, the tiles must be set in the wall with their voids horizontal. If the voids are vertical, opportunity is given for up and down circulation of air within the wall with the following result:

In summer the sun heats the exterior face of the wall. This heats the air in adjacent voids within the tile. The voids being vertical this heated air rises to the top of the wall. While the heated air is rising, the cooler air within the vertical voids adjacent to the interior face of the wall is falling, and, since it is impracticable to prevent communication between the exterior and interior vertical voids, circulation within the wall takes place, the air going up one side and down the other, transferring the heat from one face of the wall to the other. In winter the same operation takes place except the air currents take the opposite direction, and nonconductivity is not secured.

If, on the other hand, the tile are laid with voids horizontal, circulation within the walls is prevented; the air is confined and a nonconductive wall is secured.

It will also be noticed that, although no single tile or column failed under a less load than 3465 lb. per sq. in. of vertical web section, the above specifications limits the permissible load to 200 lb. per sq. in. of web section (a safety factor of about 17). This 200-lb. load when applied to tile as ordinarily made for load-bearing walls permits their being loaded over 5 tons per sq. ft. of wall area.

There is a marked difference between the clay body of the webs of hollow tile and that of common brick. This results from the different process by which each is manufactured, tile by the "stiff clay," and common brick by the "soft clay" process. A given weight of clay made into properly constructed hollow tile builds as much wall, of equal strength and far less conductivity than double that amount of clay made into common brick by the "soft clay" process, by which they are made.

The more the writer has studied the subject of building with hollow tile instead of common brick or wood, the more he has felt that it is a subject well worthy of careful investigation by engineers and architects, and that cities should avail themselves of the use of this valuable form of construction, by adopting specifications that properly prescribe its use. Cleveland architects as well as those in some other localities are recognizing that they can build tile residences, many of them stuccoed on their exterior, practically as cheap as frame and that are enduring and fireproof.

The suggestions embodied in the above refer particularly to tile laid with voids horizontally.

If it is desirable to use tile laid with voids vertically, a specification regulating this type of construction should be adopted in addition to the above specifications.

Government Grants for Road Building

Under Proposed Highways Bill Various Provinces will be Financially Assisted in Permanent Road Work — Economy of Good Roads

It is gratifying to know that the movement for good roads will have the assistance of federal grants to the different provinces. The Highways Bill before the House of Commons provides for encouragement to the provinces to construct new main roads or to improve those now existing. Under this legislation the cross roads and other less important highways would receive no assistance, but would have to be dealt with entirely by the provinces and municipalities. When it becomes law it ought to encourage the provincial authorities to constitute better main roads, for under the act the governor-in-council would be empowered to aid by contributions when the provinces undertake expenditures for construction or improvements of a permanent nature. A large delegation recently waited upon the Government at Ottawa with respect to this matter, asking for a general system of grants for county roads maintenance and construction. The Premier, in his reply, stated that the supplementary estimates to be brought down would contain grants to the various provinces, but the money would be for construction and not for maintenance. There would be co-operation with all the provinces, but further than this the details of the scheme had not been worked out.

Quebec's Attack on the Problem

The Quebec Government seems to have concluded that only very large help will avail to produce good roads. Its offers of very substantial aid, during the last two years, to every rural municipality which would undertake a certain amount of permanent work each year, and substitute a cash tax for statute labor, have not been taken up as readily as expected. One reason is found in the fact that the work had to be piecemeal in its character. The amount that a single municipality, with perhaps 40 or more miles of road, could earn in one year was limited. In case of macadamizing, contracts had to be made each year for two or three miles of road at a time. There were also many questionings as to which roads, or parts of roads, should be made first.

The hesitation of the municipalities to accept the government offer, even in those cases where the change from statute labor tax to a cash tax was acknowledged to be reasonable, has been due largely to an instinct that a still larger policy was called for—one that would mean, in fact, a general transformation from bad roads to good roads—and it is hoped that the large policy announced by the Quebec Government will meet the situation.

We are not aware of the details of the measure, but the general principle that the province will guarantee the loans of the municipalities for this purpose up to ten millions of dollars, pay one-half of the interest and provide one-half of the sinking fund, should surely set agoing a lively transformation.

Economy of Good Roads

That good roads are not only makers of civilization, but makers of trade, all history shows. They mean to the farmer a saving in wear and tear, and a less expenditure of physical energy for his horses; they ensure also the carrying of larger loads of produce in less time. The actual gain on these points alone has been calculated by sound methods for some of the States of the United States, and has had to be expressed in millions of dollars annually. With a complete system of good roads throughout, and reasonably large expenditure to get them would be repaid many times over, and it would give a great impetus to agriculture.

Road System in New York State

In New York State a very comprehensive method of road improvement has been adopted. That State began the movement in 1899, and has spent money freely in an effort to secure better roads. Up to 1905 she had expended about $4,500,000. This expenditure brought such satisfactory results that the State decided on a more extensive scheme and floated a bond issue of $50,000,000, which is to be spent in seven years. Pennsylvania began her good roads movement in 1903 and since that time she has expended about $20,000,000. Altogether there is being spent annually in the United States on good roads improvements about $95,000,000.

The system adopted in New York State is very efficient. Every mile of highway in that State outside the incorporated villages and cities is under the direct charge of the State Highway Commission. State roads, of which there are about 3,200 miles, are being constructed entirely at the cost of the State. To country roads the State contributes half the cost of construction and to township roads it gives one-third of the cost. The maintenance of these roads is similar to the French system, where a patrolling foreman takes care of from five to ten miles of road. He is provided with a horse and cart, crushed stone and the necessary implements and makes the minor repairs as they are needed. In this way the roads are kept in perfect condition. While the townships and counties pay for part of their improved roads, the work on them is under the direct control of the State Roads Commission. This has been found necessary in order to secure a uniform system of road making. In that State statute labor has been abolished and a system substituted under which the State contributes 25c. for each dollar raised by the township. The new system works very satisfactorily and as a result the State is annually securing hundreds of miles of good roadway.

The International Highway

The Province of Quebec, acting in co-operation with New York State, has set a good example in the projected international roadway between Montreal and New York. The highway, an important link in transportation, may be completed next year, and will be opened for traffic during the year following. It is already regarded as a link in a through road between Quebec and Miami in Florida.

Here is an appreciation of the importance of vehicular traffic. The fifty miles of the Montreal-New

York section in Canadian territory will proceed from St. Lambert through Laprairie, St. Boniface, St. Phillips, St. Jacques, Napierville, and Lacolle to Rouse's Point. These places will all feel the benefit of Provincial activity in solving one feature of the transportation problem. An agreement has been made by which the character of the road will be the same on both sides of the boundary.

Tannic Acid for Treating Clay Roads

The use of tannic acid in the treatment of clay roads is as yet in an entirely theoretic state, although certain experiments with clay and tannic acid have shown that the effect of tannic acid upon clay, particularly in pottery work, is most remarkable. The acid dissolved in water and applied to the clay roads is expected to overcome the alkali in the clay, render the clay impervious to water and leave a moist, smooth, noiseless and dustless road on which the grass or weeds will not grow.

A solution of one pound of tannic acid, dissolved in from 10 to 20 gallons of water, will be used and applied to the road in such a way as to secure the greatest possible penetration. A series of treatments on a scarified road, the operations to be carried on in dry weather, would probably be necessary to test the theory.

A mere surface treatment penetrating an inch or so, would not be sufficient, as there must be a thick enough covering of treated clay to distribute the concentrated wheel load over a suitable area of sub-soil. If this were not done, the clay beneath the surface would become saturated with moisture, turn into mud, and the surface would be immediately cut through.

The inventor is Mr. S. Peace, of Toronto, who has patented the process, but states that the patent restrictions will not be applied and that free use of the process is given to the public. In accordance with the usual practice of the Ontario Highways Office, any reasonable proposal of such a kind will be cheerfully investigated, and it is expected during the coming season to determine the merits of the treatment. It is applicable to pure clay only and its use is thus restricted.

The Use of an Inverted Siphon in Street Drainage

The city of Pittsburg, Kansas, has no storm sewer or drainage system worthy of the name. There are a few isolated, short pieces of underground drain, but everywhere else the surface water is carried on the surface of the ground, usually in the streets, to the nearest ditch or natural drain. At all street intersections the water must cross one or both of the intersecting streets. On unpaved streets the water is usually carried across in shallow box culverts. On paved streets the method heretofore used in Pittsburg has been to depress the crown of the pavement and carry the gutter grade right across the intersecting street. Where there is a railway on the street crossed, this leads to serious difficulty. If the water is carried in an open gutter between the ties and under the rails this obstructs a considerable portion of the width of the street at a point where the full width is most needed—at a railroad crossing. The writer believes that all engineers will admit that an open gutter under these conditions is not good engineering practice. Then since a covered waterway is necessary there are two ways of building it; either the gutter grade may be followed right through the covered waterway, or it may be depressed more or less in the form of an inverted siphon.

Conditions like those mentioned above confronted the writer in the paving of Fourth street at its intersection with Olive street, see Fig. 1. Fourth street is the principal street leading to the country toward the west and has a single street railway track in the center. It carries practically all the traffic from the country to the west of the city. Olive street is a cross street and has in it a little-used steam railway track and for these reasons has very little traffic. The natural drainage is toward the west along Fourth street crossing Olive street. It was therefore necessary to carry the water across Olive street on both sides of Fourth or to carry it across Fourth and then across Olive street. The latter course was adopted on account of drainage conditions farther down the street. On account of the conditions mentioned above, an open gutter across Olive street was out of the questio.

The depth of the gutter was 8 ins. If the uniform grade culvert was adopted the clearance would be only 6½ ins. and the clear width necessary to give as much waterway as the design finally adopted would be 35 ins. This would have made necessary the use of concrete or other masonry for the bottom and sides and cast iron for the top. The writer objected to this form of construction because of its first cost and because he feared trouble and possible danger from the displacing or breaking of the cast iron cover plates. After giving much thought to the subject the writer decided to try an inverted siphon. Inlet and outlet catch basins were all made alike except that the gutter was slightly depressed or dished at the inlet but not at the outlet, see Fig. 2.

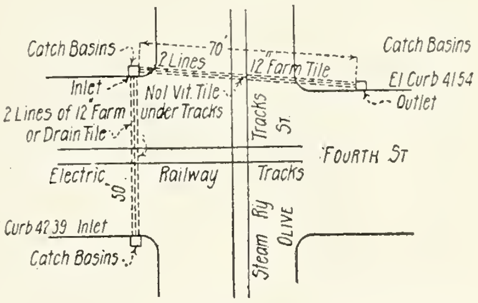


Fig. 1.—Plan of street intersection showing location of inverted siphon.

The principal advantages of this form of construction over the shallow culvert covered with cast iron are a much lower first cost and freedom from the troubles due to the breaking or displacing of the cast iron cover plates. Another advantage is the possibility of using the catch basins and underground drain as part of the storm sewer system which the city must some day have. The only advantage which occurs to the writer is the possibility of the inverted siphon becoming stopped up with sediment and washings from the street.

In the design an attempt was made to guard against stopping up, and, in case it should become stopped up, to facilitate cleaning. The catch basins extend 2 ft. below the outlet tile to catch material heavy enough to settle. The outlet catch basin was built in the same way, on the supposition that some

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[1] Paper by L. E. Curfman, City Engineer, Pittsburgh, Kansas, before Kansas Engineering Society, January 24, 1912.

of the heavier material might settle here. Another reason for making the catch basins all as shown was to facilitate the use of sewer cleaning tools in case of a stoppage. The reason for believing that the tile would not stop up was that when the volume and velocity of the water on the street surface is sufficient to pick up and carry along the street dirt, the velocity through the tile is sufficient to keep the dirt moving. And conversely, when the velocity in the tile is not sufficient to hold the dirt in suspension the rainfall is not heavy enough to pick up street washings in troublesome quantities. The writer had sufficient faith in the arrangement based on this argument, to give it a trial. With what degree of success is indicated below.

The pavement was constructed from the high toward the low end so that the water flowed from the newly constructed pavement through the siphon. A few days after the pavement was completed past the siphon a heavy rain filled the inlet catch basin up to the gutter level with sand from the newly paved street. Although the inlet catch basins were completely filled with sand it was found that the tile itself was not nearly full and the sand was blown out with a fire hose without difficulty. This occurred about July 1, 1910. The Commissioner of Streets informs the writer that the catch basins have been cleaned about four times since then and that the street has had a shovel cleaning five or six times. He keeps no convenient record of these things. This is all the cleaning the street and the siphon have received, and the siphon has never been stopped up but the one time mentioned.

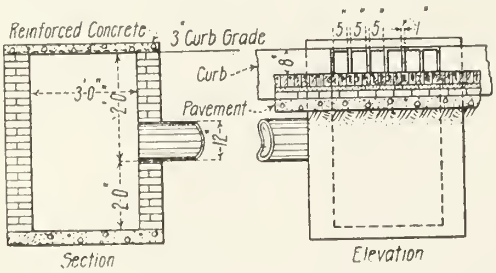

Fig. 2.—Catch basin at ends of inverted siphon.

The outlet was provided with a grating the same as those at the inlets and, although the outlet area was about 6 per cent. greater than the combined area of the tiles, this was not always sufficient. The water at the outlet catch basin has been seen to exert a pressure upward on the cover slab. This was indicated by the water spurting out in jets from under the cover slab which was laid loosely on the wall without a mortar bed. This grating at the outlet has been removed because it was found to catch straws, leaves, etc., which had passed the inlet gratings and thus obstruct the outlet. The writer has had no chance to observe the operation of the siphon since the grating was removed but of course its efficiency is increased.

Having seen the operation of the siphon and the velocity with which the water leaves the outlet, the writer is firmly convinced that there is very little danger of the siphon ever becoming stopped up, even if it should be neglected much more than it has been in the past. The velocity is such that only the larger particles of sand and pebbles settle in the catch basins, and nothing settles in the tiles until the catch basins become full enough partly to close the entrance to the tiles.

In conclusion, the performance of the siphon has exceeded the writer's expectation. With the outlet grating removed as mentioned he can suggest very little improvement. It would offer some protection to the tile to trap the entrance to the tile say by putting on a 90° elbow with the end turned down. This would prevent the heavier materials from entering the tiles, but it would also diminish the flow to some extent.

The writer is not a strong advocate of the use of the inverted siphon in street drainage and does not believe that it is always the best engineering practice. However, the experience described above will no doubt be of interest to some engineers.

An interesting use of electricity was recently demonstrated in England, where a wooden bridge was cut down by means of electrically heated wires. The bridge had been condemned and was to be replaced by a steel structure supported on the old masonry piers and abutments. Three weeks was allowed in which to dismantle the woodwork, but it proved impossible to accomplish the work in so short a time without the use of dynamite or fire, which undoubtedly would have injured the masonry. Finally an electrician proposed to destroy the bridge by the use of electricity. Each span of the bridge contained twenty-seven planks, and it was proposed to cut them so that they would drop into the water simultaneously, clear of the piers. The structure was wired, and sufficient current was employed to bring the wires to a cherry red. An hour and forty minutes after the current was applied, the first span was cut and fell into the water. The operation was begun at five o'clock in the morning, and at two o'clock at night the structure had been demolished without injuring the masonry.

A gravel-washing apparatus for supplying concrete aggregate from suitable excavated material was constructed by a small addition to the mixing plant on one of the bridges of the Cleveland Short Line Railway. Two inclined timber tables were set beside the storage bin, one above the other, and dipping in opposite directions, so that material would run from the first onto the second and thence to a pit under the bin. A grating was placed at the foot of the first incline to prevent large stones or other matter from falling to the lower one. In the operation of the plant the excavating clam-shell bucket dumped on the top incline or table where a hose played on the material and washed it down to the second. Large pieces were screened out in passing, while fine sediment and light foreign matter were taken up by the water and carried off to one side. The clean gravel and sand collected in a pit at the foot of the inclines. A bucket elevator lifted the washed material to a revolving screen above the bins.

In reporting the first of a number of lectures on Reinforced Concrete, which are to be given in Montreal by a University professor, a local reporter observed that these lectures were intended for architects, engineers, and others having "an elementary knowledge of the subject." We suspect that in his reference to "others" he meant the editors of technical journals. In any case, we do not care for such cynicisms. And if the point were unintentional it would only make it the more annoying.

Economics of Practical Concrete Work

Selection of Materials and Machinery—Mixing, Placing, Finishing — Construction of Forms and Centres — Reinforcement — Costs*

CONCRETE is a peculiar building material in that it is manufactured on the job, whereas, stone, brick, steel and wood are delivered on the site ready for installation into the structure. The cost of stone as delivered is determined by its quality and hardness, and by the distance of transportation and the cost of quarrying and dressing. The cost of the brick as delivered is determined by the quality of the clay from which it is produced, the methods of manufacture, the quality of the product, and the distance of transportation and also by the cost of labor to handle, sort, and select. The cost of steel is more nearly consistent, but even this material is affected by the character of the material, the shapes into which it is rolled, the sizes of such shapes, and the distance of transportation. The cost of timber is likewise affected by the character of the wood, the size of the pieces, the grade, and the distance of transportation.

In all of the foregoing standard building materials, no man would think of bidding without first ascertaining what was required and then obtaining a price from those who were qualified to furnish the specified material. In the case of concrete it would appear that the elements entering into its construction are in most cases entirely overlooked; that concrete is treated in the estimate without any regard to the varying character of materials and proportions entering into it. This is not as true now as it was a few years ago but it is still true in a great many proposals.

Selection of Gravel or Stone.—Most specifications allow either gravel or stone to be used. Where good gravel can be obtained it is preferable to stone, from a cost standpoint, and it is more easily handled throughout the entire operation of mixing and placing. Broken stone is usually obtained from quarries, and must be transported by railroad cars, unloaded by hand, and then hauled to the location of the work. Gravel, on the other hand, when loaded is hauled directly to the site of the work. From a cost standpoint we have therefore two reasons why gravel is preferable. (1) Under ordinary conditions there is less manual labor connected with its relivery; (2) there is less cost for manual labor due to the nature of the material; a laborer can shovel approximately 20 per cent. more gravel than stone under the same conditions.

If the gravel is good, the resulting work is equal to or better than broken stone concrete. A good gravel for concrete should be of varying sizes wherein the sizes of the pebbles range downward from say, 2½ ins. to ¼ in. The proportions of sizes should be such that there is approximately 50 per cent. of each size with reference to the next largest. Concrete made of such materials will be homogeneous, dense, and of great strength. Either gravel or stone should be watched very carefully for foreign materials, such as lumps of clay from stripping the hard pan strata, sticks of decayed matter, etc. So-called yellow gravel is not necessarily a sign of weakness, although such a deposit should be carefully examined. Many times such a surface discoloration is caused by leechings from deposits or strata of oxide of iron or other minerals.

Selection of Sand.—Much that has been said about gravel is true of sand except that sand is in a sense more important than gravel. Sand should be relatively clean and of varying sized grains. Such a sand is much better than when of even sized particles, and I think I am safe in saying that silt up to 5 per cent. will not affect the strength of the resulting concrete. If, however, sand is silty to any such extent care must be taken that the work is cleaned every morning (this same remark applies to the gravel) for if this is not done there will arise to the surface of each day's work a soft slimy substance, which has no strength and which will form strata of demarcation between the successive courses. Other things being equal it is better to import sand at an increased cost, using local gravel, than to use local sand and import gravel and stone.

Selection of Cement.—At the present time there are so many brands of Portland cement of recognized value that as far as quality and ability to withstand tests are concerned there is little choice. When it comes to large and important work, however, it is well to consider the capacity of the plant and be sure of its ability to deliver the cement on time and in quantity required.

Selection of Machinery.—Various types of work naturally demand various types of machinery and arrangement, but in general it may be said that a small mixer is not economical. Use preferably nothing smaller than 18 cu. ft. mixer, which will deliver ½ cu. yd. of mixed concrete, and use a larger mixer than this if the work will justify it. Also in general it may be stated that each batch from the mixer should be handled as a whole as nearly as possible to the place of deposit. The wheelbarrow is no longer the primary method of transportation of concrete. There is no doubt as to the majority of opinion being in favor of batch mixers, but whatever the type adopted, it would be well in the long run to install 20 to 25 per cent. more boiler and machine power than is specified by the manufacturer.

When Hand Mixing is Justified.—Hand mixing cannot be expected to be as uniform as machine mixing, and yet if proper care is taken under intelligent supervision good results can be secured. From the standpoint of cost, hand mixing is preferable, when the work is so small as not to justify the installation of a machine. For instance, on a job of a couple of hundred cubic yards $100 would probably be expended in installing and rigging the mixer, or a cost of 50 cts. per cubic yard, and it is doubtful if hand mixing would cost any more than this difference. Again, hand mixing is preferable in connection with large work where in order to reach isolated portions of the work it is more economical to mix by hand than to wheel long distances. Hand mixing is most important when constructing floors, sidewalks and pavements in a natural foundation where it is possible to shovel material directly upon the mixing board, mix and then shovel into place upon the opposite side. Under no circumstances can machine mixing compare in cost with this method where conditions will permit of its use.

Mixing Concrete.—For ordinary work, concrete should be mixed wet, soupy. From the standpoints of quality, ease of handling and manipulation, resulting finish, and cost of surfacing, there is absolutely no question as to this point. This choice of wet concrete applies to walls, bridges, reinforced concrete buildings, etc., but for sidewalks and pavements economy demands a dry mixture requiring tamping in order that the workmen applying the finish may follow as quickly as possible after the depositing of the concrete.

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*Paper by De Witt V. Moore, Indianapolis, Ind., before the Indiana Engineering Society.

Placing Concrete.—No concrete should be placed until it is definitely determined that the forms are correct and properly braced. It is cheaper to delay the work than to cut out work already done. Concrete should be placed as quickly as possible after mixing and not be disturbed thereafter. The placing of concrete is one point where the material is abused to the greatest extent. We take great care of a green brick wall but do not hesitate to walk over and conduct operations over concrete which has not reached its final set, thereby destroying the surface of the concrete for all time. While this may not be serious in some cases, it is certainly not desirable in thin concrete slabs. Concrete is better placed by chutes than by wheelbarrows, cars, etc., for the reason that by chuting, the material is constantly kept in the process of mixing until it is deposited in the work. With barrows or carts the heavier particles settle to the bottom and when the mixture is dumped into the work there is a separation. Chuting also allows the placing of the concrete with a minimum of working back and forth over the work just completed.

The ideal condition would be to the completion of the work without interruption, but as this cannot be attained care should be taken in the location of and in the manner of constructing the connecting joints as the work progresses. Breaks should preferably be made at the center of slab spans and at the center of girders or over the center of columns transverse of girders. Slab spans may be jointed longitudinally over centers of girders or beams, but this method should be considered a second choice. Columns should not be poured all at one time. Generally a height of 4 ft. should be allowed to set for three or four hours before the second pouring. Slabs, girders and beams should be poured continuously up to the determined joint where stop forms have been placed. The method of pouring girders up to the bottom of the slab and then afterwards placing the slab is not desirable. The method of pouring a slab and allowing the material to slope down over the girder and then beginning the next day gives a slip slab joint which cannot be recommended. In all concrete work stops should be made on horizontal and perpendicular lines at locations mentioned, the forms being carefully placed.

Finish of Concrete.—We are wrong in our present practice of finishing concrete surfaces. The surface finish of a piece of concrete should be an integral part of the main construction and of the same mixture and same composition. Time was when we were called upon to plaster and apply a surface coat to vertical surfaces. After a good many years of argument by the practical concrete workman we have reached a point where such surfaces are generally finished by spading so as to bring the finer particles to the surface and force the large particles back so they are not exposed. We are, however, following the old practice in respect to horizontal surfaces, applying a thin coating of a rich mixture on top of our cheaper concrete base. In order to secure the best results we should so manipulate our concrete as to bring our finish to the surface from the material of the concrete base. When we reach this point we will have less trouble with checking, insufficient bond, etc., etc., and such a finish can be easily obtained by the use of proper tools for tamping.

Construction of Forms and Centers.—If there is one element entering into the cost of concrete which is neglected it is the cost of forms and centers. So far as it is known to the writer, no architect or engineer ever submits to a bidder a plan for this part of the construction. Even the specifications are vague and indefinite, leaving it to the individual contractor to plan his own work. Some go to one extreme and use a great deal more timber than is necessary, others to the other extreme and use so little and of such light construction that the work is out of line and out of plumb. When it is considered that the cost of forms and centers represent from 20 per cent. to 33 1/3 per cent. in the cost of every cubic yard of concrete placed, under average conditions, it is hard to understand why the subject is not given more consideration.

Ordinarily it is left to the carpenter boss to put up something by rule of thumb and by his judgment based on past experience. There is nothing practicable about such a method. The designs for the forms of any structure should be carefully planned to accomplish the results with a minimum of material and labor, giving due consideration to the maximum amount of salvage in the material. It is our contention that accompanying the plans for any structure there should be prepared by the engineer and architect a sheet detail drawing showing how forms should be constructed thereby insuring quality of workmanship and placing all bidders upon the same basis. If this is done there is nothing to hinder any contractor from submitting an alternate design.

Types of Reinforcement.—Types of reinforcement now on the market may be classified as follows: (1) Plain bars either medium or high carbon steel; (2) plain bars deformed or cold worked to secure deformation. This classification includes cold twisted and hot twisted square bars; (3) special patented types of plain or deformed patented bars; (4) built up bars meaning thereby combination of various sized members in order to utilize the quantity of steel to the best advantage; (5) built up frames composed of bars of various sizes, generally used for beams, girders and columns; (6) floor slab reinforcement of sheet metal, sheared, punched or expanded in order to distribute the steel through the mass and delivered in sheets; (7) cold woven wire similar to fencing material delivered in rolls; (8) secondary reinforcement in the way of hoops or bands for columns, stirrups for beams, and spacers for rods; all of which may be made of hoop iron or wire.

Selection of Reinforcement.—Considering the various types of reinforcement just mentioned and the many modifications now on the market it is a difficult proposition to select the best, and generally the selection is determined by the price submitted by the commercial engineers bidding under sub-contract to furnish the metal. To a certain extent this method is dangerous but it is hard to suggest a remedy. Individual preference and experience are always a very large element.

Placing Reinforcement.—The design of a concrete structure contemplates the placing of the reinforcement in exactly the position shown by the plans and cross sections of the various members. Designers are usually quite conservative in their allowance for protection of steel by fireproofing concrete below it, and the contractor better err on the safe side and take advantage of this allowance rather than to keep above same. Many times reinforcement and especially light bars, expanded metal and wire fabric are laid upon the forms and then afterwards manipulated by a hook as the concrete is placed, jerking the reinforcement upward so that the concrete may flow underneath. This is dangerous inasmuch as there is no gage to determine the final position of the reinforcement and if the concrete flows under the reinforcement in too large a quantity it is almost impossible to replace the reinforcement without rebuilding the entire work.

Automatic spacers and devices for the accurate placing of the steel are readily obtainable and should be used. Naturally there is some increase of cost due to such a method but it is money well expended. Especial care should be taken in placing steel in girders and beams so to distribute and arrange the bars that each individual part may be incorporated within an individual part of the concrete. The reinforcement for columns should be accurately made and wired with the hoops and stirrups in place before it is erected in place ready to build the column forms around it. While good results can be secured from bar reinforcement the author is at this time in favor of built up columns of light structural shapes for the reason that the integrity of the whole building depends upon the column construction and a failure of any one column is liable to result in a failure of the entire building. Perhaps the most important reinforcing detail in respect to proper placing is top reinforcement of reverse flexure bars. No matter what the designer may have in mind in theory and how these bars are proportioned with reference to the main reinforcement at the center of the slab or beam, it is absolutely essential that these top bars be placed accurately and not disturbed thereafter. This is easier said than done. The main reinforcement is embedded in the solid concrete below the surface and is protected from disturbance. The top reinforcement is close to the surface where it is affected by the future operations and also where the free ends project in case of a break at the joints in the progress of the work. These free ends if jarred will many times break the bond of the half bar extending into the work. The placing of loose stirrups is a task requiring very careful supervision and this is one of the strong arguments for built up sections wherein the stirrup shear members are rigidly connected. Finally the employment of an expert mechanic or steel worker at increased wages over common labor is justified by the importance of this part of the work.

Proportions of Concrete.—It is very usual to specify 1:2½:5 or 1:3:6 for the proportions of cement, sand and gravel, for plain or monolithic concrete work and the usual specifications for reinforced concrete is 1 part cement, 2 parts sand and 4 parts gravel; although some engineers specify a richer mixture for columns. Inasmuch as there still exists a general ignorance on this point whereby these specifications are understood as being 1:7½ or 1:9 or 1:6 respectively it would seem best that the specifications should read that a mortar should be mixed of one part of cement to so many parts of sand and this mortar should then be mixed with so many parts of the aggregate.

Proportions of Concrete for the Strength.—The ideal mixture of concrete assumes that the aggregate and mortar are mixed in such proportions that the most dense, solid and homogeneous mass is secured. This result may be secured by expert engineering supervision, but in reality the good common sense of the expert concrete laborer may be depended upon. The artisan who is accustomed to handle concrete can determine by the appearance of the concrete mixture and by working the mixture whether he is securing the best results and after a long experience the author is inclined to say that he would just as soon trust a practical common-sense laborer's opinion as to base his work upon the report of a so-called expert engineer.

Proportions of Concrete for the Cost.—If a 1:2:6 mixture will satisfy the necessary strength required for construction, there is no necessity of specifying a 1:2:4 mixture inasmuch as the first mixture will require approximately 1 bbl. per cubic yard, while the latter will require 1½ bbls., a difference of at least 50 cts. per cubic yard in actual cost. Many times for footings and monolithic work ¾ bbl. per cubic yard of concrete is all that is necessary. Why specify a rich mixture when one with a less amount of cement will answer the purpose? If the contractor is at all skilled in estimating, the extra cost will be included in his proposal.

Estimating a Proper Analysis.—No proposals should be made upon a concrete job until a proper analysis has been made of all the elements entering into the concrete construction. It is not sufficient to say or to guess that the cost of a cubic yard is so much but instead an analysis should be made of the cost of a cubic yard of concrete under the conditions specified. There are a great many elements entering into the cost determined by such an estimate which will be briefly stated in the following:

Cost of Materials.—Depending upon whether the concrete is to be made of a natural mixture of gravel or of stone and sand in various proportions will depend the cost of the aggregate. The amount of cement depends upon the proportions of the concrete, as also do the amounts of gravel, stone and sand. The cost of water for proper manipulation should not be overlooked. In cities the cost of water is determined by rates of 9 or 10 cts. per cubic yard. Outside of cities the cost depends upon the labor necessary to secure the water.

Cost Affected by Locality.—Concrete work remote from populous centers cannot be done at the same price as when close to such centers, unless the work is so remote that a permanent camp can be constructed and the laborers held by the very remoteness of the work. Work that is at some distance from the point of supply must bear a charge for transportation, handling and hauling of raw materials. This is a labor charge which is chargeable to material inasmuch as the materials should be considered as f.o.b. the job, but nevertheless the cost is increased per cubic yard in the proposal.

Cost of Work as Affected by Forms.—A wall of concrete 27 ft. thick may be retained by the same forms and the same amount of form labor as are necessary for a wall 1 ft. thick. In the latter case the cost per cubic yard of concrete is 27 times as great. It is, therefore, not safe to estimate the cost of forms on a basis of guess price per cubic yard of concrete. Each individual job should be estimated for the amount of timber work as carefully as for any other item. It does not matter whether the cost is estimated on the basis of floor foot or concrete surface or upon a basis of feet board measure of lumber, the result is the same inasmuch as this important branch of concrete construction receives individual consideration.

Cost of Work as Affected by Centers.—There seems to be a misunderstanding as to the separation of forms and centers. Forms properly speaking consist of the timber work to form those members of concrete construction, such as columns, girders, etc., which must possess a certain regularity of form and evenness of outline. Centers properly speaking consist of timber supports for floor slabs, bridge centers, etc. Where the great amount of labor on timber work is expended solely for the purpose of supporting the mass at a uniform or definite height the unit cost is much less than for forming for individual members.

Cost of Work as Affected by Reinforcement.—Fabricated reinforcement will cost much more delivered to the job than loose bars, but on the other hand, will cost much less to place in position. It is needless to say that a job where reinforcement is made up of small bars less than ¾ in., will cost much more per ton for labor than for large sections. Good judgment must prevail in this particular. It is very seldom that an estimate will be made based on the labor and the tonnage of each size bar. Rather it is the practice to strike an average labor price in harmony with the class of work to be encountered with reference to the different sizes of reinforcement. It is well to remember, however, that it takes practically as long for the steel man to place and wire a 3/8-in. bar as a ¾-in. bar, while the tonnage is only one-fourth as great, and this point should be kept in mind in making an estimate.

Cost of Work as Affected by General Charge Items.—There are a great many items of the cost of concrete work which are included in the cost of materials, labor, forms and centers, reinforcement, etc. These costs consist of installing and removing machinery, coal, oil, repairs and fittings to machinery, general charge items such as rope and bolts, and the loss on petty tools such as shovels. Such costs may be determined on the basis of so much per cubic yard, or preferably they may be determined on the percentage of labor on different classes of work. No matter what the method of determination, the costs are real expenses and are as justly chargeable as those for the gravel, or cement entering into the work.

Summarized Detail Estimate of the Cost of One Yard of Concrete.—In the line with the foregoing remarks and the importance of the detail study of concrete we submit the estimate for a cubic yard of concrete which according to specifications should be of a 1:2:4 mixture to be used for purpose of building construction and making these estimates we desire to lay emphasis on the fact that no two jobs cost the same when itemized in this way.

0.9 cu. yds. gravel at $1.20	$ 1.08
0.45 cu. yds. sand at $1.00	.45
1½ bbls. of cement at $1.20	1.80
Water	.10
200 ft. B.M. of lumber at $20, used four times at 20 per cent. less each time used, less 40 per cent. salvage..	1.08
Reinforcement, 150 lbs. per cu. yd., at 2½ cts...	3.75
Total cost of material	$ 8.26
Labor concrete	2.00
Labor forms, 80 ft. B.M. at $30	2.40
Labor centers, 120 ft. at $20	2.40
Labor reinforcement, 150 lbs. at 1½ cts. ...	.75
Total labor	$ 7.55
General charge items, proportion of labor 15 per cent.	$ 1.13
Total actual cost 1 cu. yd. concrete	$16.94

Each individual job that is encountered should be estimated in the same manner. It might not be necessary to throw the cost of forms and centers, reinforcement, etc., into the cost per cubic yard of concrete but however the estimate is made it should consider all these items and in the end the result will be the same. If in addition there is to be applied a surface coat or finish its cost must be added.

If there is any one item which adds to the cost it is the form and center work. For instance, in the detail estimate just given, cost of lumber and form and center labor is $5.88. If the work had been twice as heavy the cost of this labor would only have been half as much per cubic yard. This should bring home to every estimater the importance of dealing with temporary structural work as a separate unit. Personally the writer would rather guess the amount of reinforcement per cubic yard than to guess at the cost of forms and centers. The cost of labor is dependent upon the amount of concrete placed on the square foot of area of work covered inasmuch as the cost of placing depends upon the distance traveled and the amount handled. The greater the distance the less the quantity and the more cost per unit and the less the haul the greater the mass and the less the cost per unit. Such labor cost may reach anywhere to $5 a yard and it is suggested that a careful study be given each job to determine the amount of foot pounds of work necessary to complete it.

Recommendations as to Cost Records and Cost Accounting.—It is suggested and recommended that each separate and distinct job should be given a detail cost recording in line with the foregoing in order that future work may be properly estimated. It is a very simple matter to arrange a cost record book with a system of time reports so that such records may be obtained and recorded without increase in labor or cost.

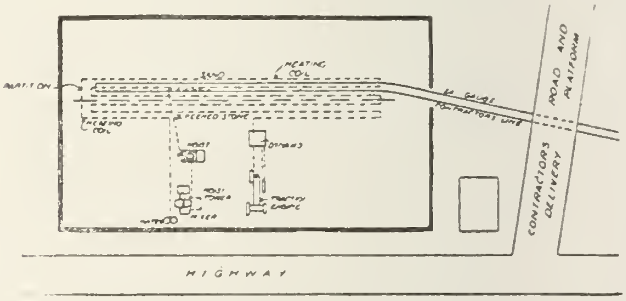
Concrete Work in Cold Weather

Layout of a Working Equipment designed to Meet Requirements of Concrete Construction in Winter

CONTRACTORS engaged in concrete work will find some useful practical hints in the following description of the methods adopted by the Newton Engineering Company of Milwaukee, Wis., for building a three-storey warehouse, 64 ft. by 112 ft. in plan, having a reinforced concrete skeleton with brick curtain walls.

The arrangement of the plant, as shown in the accompanying diagram, comprised an electrically-operated concrete mixer discharging directly into the bucket of an electric hoist consisting of a sectional steel tower with guides and head-frame for operation of the bucket-shaped cage. A special feature of the hoist was the manner in which the lower part was carried horizontally in order to cause the cage to pass under the outlet of the mixer so as to receive the concrete without involving the use of intermediary appliances. In addition to saving the cost of unnecessary handling, this method possesses the recommendation of reducing to a minimum the period elapsing between the mixing and deposition of the material.

The electrically-driven gear for operating the concrete hoist was provided with an extra winding drum for transporting trucks of material running on 24-inch gauge track shown in the plan, and rendering other aid.



Arrangement of Concrete Plant

Beyond the concrete plant proper, the contractors provided a 5-h.p. electric hoist for dealing with materials, such as brick, mortar, timber, and steel. In addition, an electrically-driven circular saw bench was laid down for preparing timber used in the construction of moulds.

As electric power was not available on the site of the works, the contractors generated the requisite current by a 20-h.p. traction engine.

Materials were brought to the site by a road, shown at the right of the plan, the wagons being driven up an inclined timber platform in which were trap doors, and their contents discharged through these into the trucks running on the contractors' track beneath, the latter being laid on an inclined trestle. The trucks employed were of special design, discharging by a hopper bottom and a side outlet. The contractors' line inside the building was carried by a trestle similar to that outside and close to a partition dividing sand from aggregate.

When the truck was used for delivering gravel, a screen was attached below the bottom outlet, the result being that sand found its way through the pebbles to one side of the partition, while the screened pebbles rolled over and collected on the other side. In order to prevent the sand and aggregate from freezing, steam pipes were laid on the ground beneath the material heaps, and supplied from the boiler of the traction engine. Exhaust from the coil was led into the vessels used for the supply of water to the concrete mixer.

The procedure followed by the contractors was generally as follows: While the moulds and brick walls for each storey were being erected, concrete materials were delivered and transported on the contractor's track to the interior of the building. The steam coil was kept hot so that the sand and stone should be thawed and remain warm until sufficient was collected for the concrete of an entire floor. When all was ready, the operations of mixing and depositing concrete were commenced, and continued without cessation until the entire floor was completed, thus obviating the bonding of old and new work. As the flooring was completed, the surface was protected by canvas, this protection, in conjunction with the use of salamanders below the moulds, salt in the water, and warmed materials, eliminating all the troubles usually accompanying the execution of concrete work in frosty weather.

While the building was under construction, the temperature for at least fifty days was below 15 deg. F. all day, and sometimes fell below zero. The erection of this building under severe weather conditions, with results said to compare favorably with those obtained in warm weather, shows that with suitable precautions reinforced concrete work is entirely practicable at low temperatures, but it must be borne in mind that the cost is considerably above the average.

Annual Meeting Canada Cement Company

According to the report of the Canada Cement Company, Limited, for the year ended Dec. 31st last the net profits were $1,382,038. After paying fixed charges and the preference dividend, there is a surplus of $278,808, equal to 2.06 on the common stock. The net profits show a gain of $204,341, while the fixed charges increased $68,229. With $75,296 carried forward from 1909, $142,697 from 1910, and the surplus for the present year, the total surplus account on December 31st last was $496,802, Senator Edwards, president of the company, in the report of the board of directors, refers to the difficulty in securing sufficient cars to carry the company's product in the west during the heavy shipping season from July to September. Notwithstanding the car shortage, however, the company was able to carry out all its contracts, although in some instances at material loss to itself. The loss occasioned by the coal strike of the summer was heavy, the company, with the largest coal areas in Canada aljacent to its western plants, being forced to import coal and transport it thousands of miles by rail and water in order to keep its plants in operation. Notwithstanding this, no advance was made in the selling price of the company's product.

The likelihood of a reduction in the price of cement is referred to in the closing paragraph of the report in which Senator Edwards says: "The consumption of cement during the past year has shown a steady increase over preceding years, and as a result we were able to operate most of our plants continuously throughout the year. By manufacturing only a uniform high grade cement, by familiarizing the public with the advantages of concrete over all other building materials and selling at the lowest possible price, it is confidently expected that the consumption of the company's product will increase from year to year. By improving and maintaining the plants in a high state of efficiency and by selling and distributing its product economically, a further reduction in the price of cement was made possible during the past year, and it is the intention of your directors to conform to the policy already adopted of giving the consumer the benefit of reductions in cost and distribution, the shareholders' profits being dependent on the increased volume of sales."

C. N. R's. Montreal-Toronto Line

The C. N. R. line from Montreal to Toronto, via Ottawa, is to be completed by the end of the year. Contractor Mullarkey, of Montreal, has two contracts—from Sydenham to Ottawa, and from Montreal to Hawkesbury, and a third was recently given to him for a ninety-mile section from Ottawa to the town of Pembroke, the latter, excepting five miles immediately west of the Capital, forming part of the Canadian Northern main line extending around the north shore of Lake Superior. Mr. Mullarkey's eastern contract comes right up to the mouth of the projected tunnel under Mount Royal, Montreal, and it is stated that the same contractor has received instructions to proceed with the extra nine or ten-mile section from a point on the Montreal and Ottawa line, swinging around to join the company's Quebec line near Viauville. It would thus appear that the Quebec trains over the MacKenzie & Mann system will use this line to reach the terminals in Dorchester street, Montreal. The two bridges now being erected over the Ottawa by the C. N. R. between Ottawa and Pembroke will be 2,600 feet and 1,200 feet in length respectively.

Among recent sales by Messrs. Mussens, Limited, Montreal, is an electrically driven 70-ton Bucyrus steam shovel specially constructed for heavy work. It has been sold to the Granite Quarries Company of Vancouver. Mussens Limited, are the Canadian agents for the makers, the Bucyrus Company, South Milwaukee, Wis. Messrs. Mussens, Ltd., have sold to Mr. G. Brabant, Montreal, a new type of steam wagon for hauling heavy material. This wagon is of the Mann type, and is manufactured in Leeds, England. The speed varies from 2½ to 9 miles per hour, and the wagon has a capacity of 5 tons, although on test it has carried 7 tons. It has been found that for heavy work rubber tyres do not stand the wear satisfactorily, and gasoline engines do not meet all requirements; consequently steel tyres and steam power have been utilized in these wagons, and with good results.

An idea of the possibilities of the Chicago Improved Cube Mixer (manufactured by the Municipal Engineering & Contracting Company, Railway Exchange Building, Chicago), is shown in an interesting and well illustrated booklet just to hand. The makers of this machine believe that it represents the concentrated ideas of the best concrete specialists in the world. They are confident that it is as perfect in construction as mechanical skill has yet been able to devise. The manner in which the Chicago mixer has been improved from time to time is told in the catalogue, and the details of manufacture and application are discussed in a way that will appeal to any practical man connected with this field.

Mr. R. S. Lea, consulting engineer, who was called to Vancouver in connection with the proposed system for Greater Vancouver, spent some time in Kamloops in February in connection with several important engineering projects that are being handled for the municipality by Mr. H. K. Dutcher, of Messrs. Gregory & Co., engineers, Vancouver. The work includes the construction of a reservoir and power plant.

The publishers of the Cement Era, 1207 Morton Building, Chicago, have favored us with a copy of their 1912, or sixth annual, edition of the directory of Portland cement manufacturers. The directory contains a complete list of firms manufacturing cement, gypsum and lime, and also of machinery and supply manufacturers. The lists are presented in condensed and convenient form and should prove most useful to the trade.

Building Codes Discussed at Montreal

Prominent Consulting Engineer Addresses Builders' Exchange—Various Phases of the Question Montreal Draft By-laws Nearly Completed

On Wednesday, Feb. 21, Mr. Walter J. Francis, C.E., addressed the members of the Montreal Builders' Exchange, at their lunch talk, on "Buildings and Building Codes." Mr. Francis is the representative of the Canadian Society of Civil Engineers on the civic buildings by-laws committee, which is framing new by-laws for the construction of buildings. The address dealt chiefly with this subject, Mr. Francis stating that he spoke as a private citizen and as a member of the committee.

The present by-laws, he explained, had been in use since 1901; it had been amended from time to time, by the building department and by the council without the knowledge of the department. It consisted of 30 by-laws and counting in the towns annexed, 55; each by-law had its own peculiarity, and a curious feature was that a certain by-law could be changed at any meeting of the council simply by means of a resolution. The by-laws had become obsolete owing to the growth of the city, and they required very drastic revision. The present committee was appointed in 1910, and had grown to be unwieldy in numbers. At the outset the committee found themselves with nothing definite to consider, and Mr. Venne, as representing the Province of Quebec Architects Association, and himself were appointed a committee to prepare a draft. That draft was still in course of preparation, about 80 per cent. of the work having been done.

Mr. Francis went on to describe the difficulties under which the work was done, and the obstacles which had to be overcome. Certain city officials were appointed to assist them, but only at the last meeting the sub-committee found that their secretary had been withdrawn. They sat at a round table in a room where other business was being transacted, and where people were coming in and out on various matters. The committee had had practically no assistance from the city's legal department. The building superintendent was assisted by 17 people, and four more were to be appointed. In Cleveland, a city of the same size, there were 72 people in the building superintendent's department. Montreal's department was under-manned and underpaid. Mr. Francis enumerated the list of duties which the department was supposed to carry out, and remarked that the officials honestly tried to live up to their responsibilities. According to the report for 1910, the net revenue of the department was $45,000 and for last year it would probably be about $65,000. In Mr. Francis' opinion the building department should not be a revenue producer, and if it came out even this was as much as ought to be expected.

A new code was necessary, and it was essential that the staff should be augmented in order to enforce it. The persons concerned in the code were the citizens, the owner, the contractor and the architect. As a citizen he was concerned in getting proper buildings and streets. The making of a code was extremely difficult, and it must be done on broad principles. Mr. Francis then related some personal experiences in order to illustrate the necessity of a thorough by-law, and went on to say that the owner was concerned to see that his money was properly spent in safeguarding the citizens, the architect was concerned to see that his plans were properly carried out, the builder was concerned to see that proper work and materials were used. The committee had acquired information on building codes from Toronto, Cleveland, Chicago, and New York, some of which had laws occupying 200 printed pages. The committee had to take American codes as the pattern, as European codes were useless owing to different practice and climatic conditions. It was interesting to note that the Cleveland and Chicago codes were on the lines on which the committee had been working and which they thought originated with themselves.

The committee had endeavored to draw up a code which dealt with principles; they did not want mere specifications, for the code could not deal with architecture. They could not prevent a man from putting up an ugly building, but they could prevent a person putting up an unsafe and unsanitary one. Mr. Francis then referred to the question of fire-escapes, and said the committee believed it was possible to erect a structure which was absolutely fire-proof. On the subject of fire-escapes, he expressed the opinion that the use of iron staircases on the outside of buildings had been greatly over-rated; some of them were so built as to make them perfectly useless. The committee had gone into this matter very thoroughly. He had also examined a great many elevated water-tanks, and in Montreal there were some that were not safe. The alteration of structures in buildings was a matter which required very careful attention. Mr. Francis concluded by saying that while Montreal was no worse off than other cities—in some respects it was better—they must have a reorganized building department in order to enforce the new code which was being drawn up.

The plan for the model city of the C. N. R., at the back of Mount Royal, Montreal, in connection with their line into the city, is nearing completion. The central passenger station of the electric line is to be located in the centre of the city and a sub-station is to be erected at the mouth of the tunnel, about half a mile distant. The plan provides for the main thoroughfares to lead towards the station. There will be two chief business streets, which will run diagonally through the city, and the station will be built at the point where these intersect. In front of the station will be a public square, flanked by a post office and two bank buildings. The business streets will have a minimum of three and one-half miles. A 66-foot circular boulevard, four and one-half miles in circumference, is also part of the lay-out of the city. At frequent intervals along this driveway parks will be established. In all sixty-six miles of streets and boulevards will be provided, and workers will start as soon as the snow is off the ground preparing for the building of sewers, the laying out of water pipes, and the installation of a conduit system in which will be enclosed the telephone and other electrical wiring. Most of the streets will be macadamized with material cut from under the mountain.

A million dollars' worth of buildings in one year in a town boasting a population of 3,500 is a prospect calculated to attract attention even in the west, yet this is what the town of Weyburn, Sask., expects to achieve during the present year. Last year the buildings erected at this point amounted in value to $640,000, and already there is work in sight for 1912 amounting to $750,000.

Personal News and Notes

During the last two years Canada has lost by fires property worth over $45,000,000.

Toronto has about one hundred apartment houses, and will have double that number before the end of the year.

The firm of Messrs. P. Lyall & Sons, Limited, showed net profits of $232,000 for the year ending January 31st, last.

Mr. and Mrs. P. Lyall, Sr., and Mr. and Mrs. W. Lyall have left Montreal for a month's trip through the Caribbean Sea.

Mr. A. Ghysens, assistant engineer in the Aqueduct Department, Montreal, will spend a month in Europe on private business.

Sir Wm. Mackenzie was in Ottawa last week seeking a Federal subsidy of $12,000 a mile for a 520-mile line from the summit of the Rocky Mountains to Vancouver.

Mr. H. A. Woods, assistant chief engineer of the Grand Trunk Pacific, who has had his office in Montreal since the commencement of the road, has moved to Winnipeg, together with his staff.

Mr. A. J. Hoolahan, on the staff of the B. Grier Lumber Company, Ltd., Montreal, has been appointed assistant secretary of the Montreal Builders' Exchange, in succession to Mr. W. A. Stanley.

Mr. J. R. Wemlinger, President of the Wemlinger Steel Piling Company, 11 Broadway, New York, has been re-elected Secretary of the American Society of Engineering Contractors, with headquarters at 13-21 Park Row, New York.

Mr. James Oborne, formerly general superintendent of the Ontario division of the C.P.R., has been transferred to Vancouver, in charge of the Pacific division, and Mr. J. T. Arundel, his successor, formerly of Winnipeg, has assumed his position in Toronto.

The Grand Trunk Railway Company has informed the city of Montreal that it will build a new railway station in place of the Bonaventure station as soon as the plans for the viaduct are completed. This will be necessary if the tracks into the city are to be elevated.

On February 16, Mr. Clifford Richardson, M. Am. Soc. C.E., Consulting Engineer, New York City, delivered a lecture on "Trinidad and Bermudez Asphalts and Their Use in Highway Construction" before the Graduate Students in Highway Engineering at Columbia University.

The Canadian Pacific Railway will make extensive improvements in its yards at Minnedosa, Man., during the coming summer, and as soon as the weather permits the work will be commenced on a new bridge to support a second track over the river. The round-house will be enlarged and an addition made to the workshop.

A site has been selected on Dorchester street, Montreal, for the new headquarters of the Canadian Society of Civil Engineers. The architects appointed are Messrs. Saxe & Archibald, Montreal, who are now preparing plans. Operations will proceed during the coming summer. Professor C. H. McLeod, of McGill University, Montreal, is Secretary of the Society.

Mr. W. Burton Stewart, Managing-Director of Messrs. Norton Griffiths & Company, Limited, of Canada, took occasion last week to direct the attention of the press to the error of referring to his firm as Messrs. Norton Griffiths & Company, Limited, of England. The Canadian concern is properly registered in this country, holds a Dominion charter and has several Canadian directors and shareholders, with its head office in Vancouver, B.C., and a branch in Montreal.

The Citizens' Association of Montreal have had great difficulty in securing an expert as their candidate to succeed Mr. F. L. Wanklyn on the Board of Control. Several engineers have been approached, but they have all declined, chiefly on account of the inadequate salary, $7,000 a year. Mr. R. S. Lea, the last gentleman to be asked, informed the association that he has important work on hand in Vancouver, and that it was impossible for him to consider the invitation.

Before the Province of Quebec Association of Architects, Montreal, on Tuesday, Feb. 20th, Professor P. E. Nobbs, A.R.I.B.A., read a paper on "Mouldings." He gave an analysis of the mouldings of Greek Doric, showing that the profiles were of utilitarian origin, and went on to say that the forms were largely inspired by the question of material and technique. The general idea of the paper was to show that mouldings were a personal matter not at all unlike intonation and accent in vocal expression.

There is considerable interest in the details of Premier McBride's railway policy for British Columbia as brought down last week in the Legislature at Victoria, B. C. The policy includes: Extension Coldwater Junction to Hope, Kamloops to Kelowna and Lumby, Fort George to North Vancouver, Westminster and Vancouver, Campbell River to Hardy Bay, Parksville to Comox. The first line will get a bonus of $10,000 a mile and a $200,000 bridge. The C. N. P. Railway will get $35,000 a mile for its Vancouver Island line. The C. P. R. will take the Koole and Sloan line from the Great Northern for $400,000, the government granting $100,000.

On Tuesday, Feb. 20th, the death occurred of Mr. Thomas Brennan, a member of the firm of Messrs. Brennan & Cairnie, contractors, Montreal. The late Mr. Brennan, who was 59 years of age, was a native of Hogansburg, N.Y., and came to Canada 30 years ago. He was connected with the building of the St. Lawrence & Adirondack Railway, and also sections of the Canadian Pacific Railway in the West. On Tuesday he was talking in his office at West Crescent Heights, when he was seized with a hemorrhage of the brain, and was conveyed, unconscious, to his residence, 6 Lincoln avenue, Montreal. He is survived by a widow and five children.

In presenting their latest catalogue, No. 16, of the Koehring Concrete Mixer, the manufacturers, The Koehring Machine Company, of Milwaukee, Wis., express the conviction they are now offering a mixer which is developed, in principle of mixing and in mechanical construction, to the approximate limit of possible attainment. The merits of the Koehring mixer are too widely recognized for the machine to need further introduction at our hands. The catalogue is replete with excellent illustrations showing the Koehring mixer in operation. It contains, in addition, specifications, tables, and other information which cannot fail to be of interest to the engineer and contractor.

Messrs. E. R. Watts & Sons, manufacturers of surveying and scientific instruments, 45 Bank street, Ottawa (Works: London, Eng.), have favored us with a copy of their new 1912 illustrated catalogue which represents the acme of high class and artistic production in this line of business. The catalogue is profusely illustrated and is well arranged and printed in clear type on good stock. Messrs. E. R. Watts & Son are well known as contractors to all the leading Government departments, the universities and railways of the Dominion. All their instruments are manufactured at their London works and are of the finest material and workmanship, the highest possible finish and guaranteed accuracy. Engineers, surveyors and architects will be well advised to obtain a copy of this catalogue, either from the Ottawa or Winnipeg branches of Messrs. E. R. Watts & Son.

A New Western Firm

A firm of engineering contractors which promises to take an active part in development work in Western Canada is that of Messrs. Wilson, Townsend & Saunders, of Moose Jaw, Sask. The members of this firm are young, aggressive men with excellent qualifications for the field they are entering and with the additional advantage of being well known in that field. They propose to cover a considerable stretch of territory in Alberta and Saskatchewan, and the Moose Jaw district itself is growing so rapidly that there will doubtless be ample scope for their operations.

The name of Mr. J. M. Wilson will be familiar to the readers of the Contract Record and Engineering Review as the former city engineer of Moose Jaw. Mr. Wilson was born in Toronto in 1883 and was educated at the Toronto public schools, the Harbord Collegiate Institute and the University of Toronto. He received his early training in the shops of Messrs. Wilson & Cousins, of Toronto, and later as draughtsman with the Canada Foundry Company. Entering municipal service, he spent three years in the Toronto Waterworks Department under Mr. C. L. Fellowes. He was inspector and instrument man in the laying of the six-foot steel conduit across Toronto Island, and also for the waterworks tunnel, and had charge of all field work in connection with the installation of the high pressure fire system in Toronto. In 1908 he became assistant to the general manager of the Wood Products Company of Canada and had charge of the erection of their large wood carbonizing plant at Haliburton, Ont. The following year he accepted an appointment as general manager for Messrs. W. H. Oliver & Company, consulting engineers, of Toronto, and from 1910 to 1912 was city engineer of Moose Jaw, Sask. During the period of his incumbency at Moose Jaw the construction work carried out under his supervision totalled more than two million dollars. Mr. Wilson is an Associate Member of the Canadian Society of Civil Engineers.

Mr. C. J. Townsend, B.A.Sc., was born at London, Ont., in 1885. He was educated at the Toronto separate schools, De La Salle Institute, and afterwards at the School of Practical Science. His early experience was obtained in the shops of the Toronto Brass Manufacturing Company and W. C. Hunt. From 1905 to 1907 he was employed as draughtsman with the Canada Foundry Company. In the latter year he was designer and checker for the McMyler Manufacturing Company, of Cleveland, Ohio. Here he obtained valuable experience in the handling of cranes, car dumpers and structural steel. In 1908 he became identified with the Arnold Company, engineers and constructors, of Chicago, Ill., as assistant mechanical engineer. His work with this company was of a varied and useful nature, and included the design of railway shops, industrial plants, power houses, foundries, etc., also the preparation of plans for waterworks and sewage. From July, 1911, to date, he has been engaged as mechanical engineer for the Federal Brass Works, Chicago, for which concern he has had charge of the design of construction work and the installation of machinery, brass foundry equipment and so on.

The youngest member of the firm, Mr. R. G. Saunders, was born in London, Eng., in 1887 and was educated at Tollington Park College, London, and the Salford Technical School. After receiving some good practical training with the General Electric Company, of Manchester, both in the shops and in the draughting office, he came to Canada, in 1903, and obtained a position with the contractors for the C. P. R., building south from Darlington, Man. The following year he established connections with Messrs. E. Von der Osten & Company, consulting engineers, Toronto, commencing as draughtsman and later taking charge of outside work. Mr. Saunders entered the service of the city of Toronto in 1905, obtaining a position as assistant to the bridge and mechanical engineer. In 1906 he obtained a position with the Waterworks Department under Mr. C. L. Fellowes, for whom he had charge of extension work in the city. In 1910 he was appointed resident engineer under Mr. J. M. Wilson, City Engineer of Moose Jaw, to design and supervise the construction of a modern sewage disposal plant, estimated to cost $150,000. The following year he accepted a position as Assistant City Engineer of Moose Jaw, The latter post he resigned last fall to visit Europe in the interests of the newly organized firm of which he is now a member. Mr. Saunders is a junior member of the Canadian Society of Civil Engineers.

Mr. J. M. Wilson

Mr. R. G. Saunders

Mr. C. J. Townsend

As the outcome of the proposed expenditure of $10,000,000 on highways, the Quebec Government intends to create a roads department, for rural roads, under the jurisdiction of the Minister of Agriculture.

Noteworthy Features of Toronto Contract

The Canadian Pacific Railway office building at the southeast corner of King and Yonge streets, Toronto, will have several notable features. Its sixteen storeys, for example, will tower above the fifteen storeys of its neighbor, the Traders Bank Building, which now holds the record for height. The elevator service will naturally be of the utmost importance to the success of the building for office purposes. After careful investigation the company chose the plunger type of elevator and awarded the contract to the John McDougall Caledonian Iron Works Company, Limited, of Montreal. There will be five hydraulic direct plunger elevators with the necessary pumping and signalling equipment. Three of these elevators for passenger service will have a lift of 188 feet and one of 199 feet. The fifth used for ashes, etc., will have a smaller lift. As they will be plunger elevators it will be necessary to sink wells of corresponding depth and line them with steel pipe casing. The passenger elevators will be provided with every modern device to secure speed and safety in operation, including automatic limit stops which, quite independently of the operator, will slow the speed down gradually at the top or bottom without any shock or vibration. The elevators will be operated by Worthington compound steam pumps and will be directed by an elaborate flash light signal system. In general features these elevators will be similar to those built by the same company for the new C. P. R. Windsor Station, Montreal.

Austin Drainage Excavator

The Austin Drainage Excavator is the subject of a booklet that is being sent out by the F. C. Austin Drainage Excavator Company, Chicago, who claim to have the largest and most comprehensive line of ditching machinery in the world. The Austin excavator constructs a perfectly made ditch, true to grade and with the bank sloped to any desired angle. The initial expense is claimed to be lower than by any other method. The Austin trench machines are practically made of steel. The only cast iron parts are those which enter in the construction of the engine. The self-cleaning buckets with tool-steel cutting edges are a distinctive feature of these machines. No matter how sticky the ground may be, it is impossible for them to clog, because every time a bucket discharges an automatic cleaner scoops out the inside so thoroughly that no earth adheres to it. In some localities, where the earth is hard, the cutting buckets are equipped with special diggers, or hardpan rooters. Another feature is the chain that carries the buckets. Each link is attached to the other by a steel pin, having an outside collar made of manganese, the hardest and toughest castings known, and when necessary a link can be taken out and a new one put in at any point. This makes the chain almost indestructible.

The town of North Battleford is floating debentures at the present time amounting in all to $233,150, to be distributed as follows:—Waterworks extensions, $55,000; electric light extensions, $40,000; sewage system extensions, $87,000; cement sidewalks, $38,650; street grading, $6,000; exhibition grounds and buildings, $6,500. Mr. M. D. Cadwell is superintendent of the water and light department.

The Rock Forest power plant, constructed for the city of Sherbrooke, P.Q., has been turned over to the civic authorities. The plant has a capacity of 2,000 h.p., which will be used for lighting and power purposes, and the surplus disposed of to private consumers. Messrs. Beatty & Morrow were the general contractors for the work and built the dam and power house; the Jenckes Machine Company, Montreal, supplied the wheels and generators, and the Canadian Westinghouse Company the other electrical machinery. R. A. Ross & Company, Montreal, were the consulting engineers.

Tenders have again been called for a complete hydro-electric power system for the town of St. Jerome, P.Q., from plans by Mr. DeGaspe Beaubien, of Montreal. In September, last year, tenders were invited for a plant to be developed on the North River, about 23 miles from the town, the plan including a transmission line, high and low tension systems, and street lighting. The tenders, however, were returned unopened, the municipality having decided that the time was inopportune for raising the $60,000 required for the work.

The centrifugal pump recently installed at the river some three miles from Portage La Prairie for the purpose of filling up the Crescent Lake bottom is now in operation. The pump is a Gould's centrifugal type, 18-in. suction, 15-in. discharge, capable of delivering 5,000 gals. per minute against an 8-foot head. Power is furnished by belt from a Westinghouse 3-phase, 60-cycle, 220-volt induction motor. Everything is said to be operating very smoothly and it is estimated that the old lake bottom can be filled to the required depth in about 100 days pumping of 24 hrs. each.

There is every likelihood of the early construction of an electric tramway on the northern bank of the Fraser River between Vancouver and Mission City, by the Western Canada Power Company of Vancouver. There is no doubt that development of the northern bank would be greatly accelerated if transportation facilities, such as would be furnished by an electric tramline, were provided. The proposal that such a line be built was first made by the Vancouver Board of Trade, who have discussed the project with Mr. Wm. McNeill, assistant general manager of the Western Canada Power Company, with a view to the possible construction of the railway by his company.

A report has recently been filed at Victoria on the water power of the Willow River, about seventeen miles east of Fort George, B.C. This river is a tributary of the Fraser, entering the latter river some twenty-five miles above the junction of the Nechaco with the Fraser. At the Willow Canyon, located about thirty miles above the mouth of the river, and seventeen miles due east from Fort George, the Fort George Power Co., Ltd., proposes to undertake the work of developing cheap power for manufacturing and other purposes in the future city of Fort George. Several tests have already been made, one at extreme low water last August showing a flow of 250 second feet. According to the report, 40,000 or 50,000 h.p. might be obtained with sufficient storage.

Mr. A. L. Mudge, chief electrical engineer of Messrs. Smith, Kerry & Chace, on Wednesday, February 14, read a paper at a meeting of the McGill Undergraduate Society of Applied Science, Montreal, describing the plant of the British-American Power Development Company in the Cobalt district. This interesting paper of Mr. Mudge (who is a graduate of McGill) was illustrated by a large number of slides. The power house is near Lake Temiskaming, and supplies power principally to Cobalt and the mines; there is also a telephone system. Details were given of the construction of the power house, the transmission lines, electrical plant, etc., it being stated that all the engineering was done by university men. Lantern slides of the development at Lac du Bonnet, Man., were also shown.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Aylmer, Que.

City of Ottawa has granted $3,500 towards erection of a septic tank. Plans are being prepared and tenders will be called shortly. Total cost $5,000.

Calgary, Alta.

By-laws to amount to $500,000 are being prepared and will be submitted to ratepayers in near future, providing for new sidewalks. Engineer, J. T. Child.

A sewage disposal plant is under consideration. Engineer, J. T. Child advises immediate action. Council to consider at early meeting.

Kindersley, Sask.

The council have decided to proceed with an extensive waterworks scheme for the town, to cost in the neighborhood of $50,000. A plentiful supply of excellent water has been obtained about a mile from town and it is intended to pipe this in and put in an extensive distribution system covering the entire town. As the annual water-bill for the town now runs over $10,000 on the present system the new one will unquestionably be a revenue producer from the start.

Oshawa, Ont.

The Board of Water Commissioners, Engineer, Frank Chappel, Oshawa, has authorized the purchase of pumping equipment to cost $3,500. Electrically-driven turbine pumps and castings, for connecting to existing intake pipe and well. Pole line and equipment (2 miles). Plans with engineer.

Ottawa, Ont.

Tenders have been received for sewer outfall to cost $12,000. Engineer, N. J. Ker. Thos. McLachlan, $20,310 and Robert Brewde, $14,670. Engineers to report before making award.

Engineer, N. J. Ker. Ottawa Water Works Committee has authorized expenditure of $7,000 to enlarge present 15-in. pipe to 24-in. on Slater and Lyon street.

South Grimsby, Ont.

By-law to be voted on shortly, to spend $15,000 on new roads.

South Vancouver, B.C.

By-law to spend $75,000 on walks to be submitted to ratepayers shortly. Engineer's Office, cor. Fraser street and 43rd avenue.

By-law to spend $300,000 on waterworks to be submitted to ratepayers shortly.

By-law to spend $750,000 on streets will be voted on shortly.

Toronto, Ont.

Tenders are open until March 12th for construction of storm overflow sewer, Barton avenue, Section No. 2. Engineer, C. H. Rust.

Tenders open until March 12th for Toronto Junction main sewer, Sec. No. 4, Bloor street tunnel. 2,400 ft. long, 5 ft. x 6 ft. 6 in. C. H. Rust, C.E.

Tenders are open for engine and pump rooms to cost $4,500, Albany rd. and Gunns rd., for Gunns Ltd., Albany rd. Architect, G. M. Miller Co., 59 Yonge street. Brick, tar and gravel, concrete foundation, structural steel, Credit Valley cut stone, metal sash, lath. Machinery wanted.

Vancouver, B.C.

Balfour Guthrie Co., of Vancouver, have purchased 5000 acres of land for irrigation scheme in California. Engineer, Mr. Kempkey, Vancouver.

Vernon, B.C.

Tenders are called until March 11th for construction of vitrified pipe sewers. City Clerk, D. C. Tate.

Westmount, Que.

Tenders are called for sewer and paving. No. 13—intercepting sewer, Western avenue, B. No. 12—paving Western avenue. Specifications at City Surveyor's office after Feb. 19th. Received by City Clerk, City Hall, until noon, March 11th. City Engineer, Arch Currie, C.E.

Windsor, Ont.

Tenders will be called for water works pumping engine to cost $17,000. New 5,000,000 gal. pumping engine, 50 lbs. domestic pressure and 110 lbs. fire pressure. Tenders called shortly by chairman. Chairman Water Commission, T. W. Brooke, Windsor. Secretary, W. A. Hanrahan, Windsor.

Winnipeg, Man.

Tenders will be called for construction of sewer on Strathcona street from Sargent avenue to point 150 ft. north. Engineer, Col. N. F. Ruttan, 223 James avenue.

Tenders are called until March 7th for five 36-in. gate valves; three 20-in. gate valves. Engineer, Col. Ruttan, 223 St. James avenue. Sec. Board of Control, M. Peterson.

CONTRACTS AWARDED

Burnside, Man.

Municipality of Portage La Prairie; reeve, D. M. Cowan, plan to erect a concrete bridge over Rat Creek to cost $4,000. The matter will be considered at March session of council.

Ottawa, Ont.

Sewer pipe for Corporation of Ottawa. Successful tenderers, F. S. Kirby & Co., at 54½ per cent. discount off vitrified clay pipe price list. Engineer, N. J. Ker.

Windsor, Ont.

Pavements to cost $6,972. Engineer, M. E. Brian, Windsor. Contractor, Thomas Chick, Windsor. 5000 yds. concrete pavement on Sandwich street.

Water intake to cost $32,000. Engineers, Smith, Henchman & Grylls, Detroit, Mich. See. Water Com., W. A. Hanrahan. Contractor, A. J. Dupius Co., Detroit, $32,000. 60-in. steel pipe 500 ft. long, ½-in. plate and equipment.

Winnipeg, Man.

Engineer, Col. N. F. Ruttan. The following sewer contracts were awarded to Engineer of Construction; Bugo st., $4,302; Kylemore avenue, $4,478; McPhail street, $697; Thos. Jackson & Sons, Winnipeg, Erin street, $5,739; Lavinia avenue, $1,275.

Railways, Bridges and Wharves

Calgary, Alta.

Tenders received until May 12th for construction of an aqueduct 10,000 ft. long. Plans and specifications with engineer. Owner, C. P. R., Calgary. Dept. of Natural Resources. Chief Engineer, A. S. Dawson, Calgary

Edmonton, Alta

Tenders will be received until March 15th, 1912, for construction of all steel highway bridges required for 1912. Specifications and plans may be seen at Structural Engineer's office, Edmonton. Province of Alberta, Dept. of Public Works. Deputy Minister, John Stocks, Edmonton.

Edmunston, N.B.

Tenders are called until April 1st for bridge. Specifications, etc., at office of secretary. Provincial Government. Secretary, H. M. Blair, Fredericton, N.B.

Elk Lake, Ont.

The location of the Elk Lake extension of the Temiskaming & Northern Ontario Ry. has been decided on. Specifications are in the course of preparation and tenders will be called in the early spring. J. Englehart, Chairman of Commission.

Fredericton, N.B.

Tenders are called until March 4th for two bridges, Parish of Chipman, Queen's Co. Dept. of Public Works, New Brunswick. Secretary, H. M. Blair. Specifications with secretary of Public Works.

Tenders are called for erection of a bridge, Becaguinae. Provincial Government. Secretary, H. M. Blair. Specifications at office of secretary. Tenders close April 1, 1912.

Hamilton, Ont.

Plans have been submitted for new yards, freight sheds, station, retaining walls and embankments, for Canadian Northern Railway. Vice-president, D. B. Hanna, Toronto, in charge of Hamilton Works. Plans at office of D. B. Hanna, Toronto.

Hastings, B.C.

The British Columbia Electric Railway Co., 435 Carrall street, Vancouver, are making arrangements with town for construction of street car line. Engineer, Conway. Solicitor, S. Laursen, Vancouver.

Kingston, Ont.

Extensive harbor improvement is planned by government. City will submit by-law for purchase of Cataraqui bridge, which is included in scheme. Dept. of Public Works, Ottawa. Secretary, R. C. Desrochers.

London, Ont.

Tenders will be called shortly for 3 steel bridges with concrete abutments and concrete floors; spans, one 40-ft., one 50-ft. and one 115-ft. Engineer, Charles Talbot, London.

Moncton, N.B.

The Moncton & Buctouche Ry., Manager, E. G. Evans, plan an extension from Buctouche to Richibucto, N. B. No decision yet but company favors project.

Ottawa, Ont.

Plans have been approved for street railway extensions. Address Street Railway Extension Committee. City Engineer, N. J. Ker. Committee approves of outlay of $280,000 as follows: Cost to Railway for track equipment, $204,000. Cost to city for road grading, $76,000. Single track mileage 15.85 miles. Street mileage, 7.22 miles.

Owen Sound, Ont.

W. Hill, Mitchell, Ont., is at present considering inducements offered by Owen Sound for establishing of bridge works at a cost of $50,000. Complete plant and equipment will be required.

Prescott, Ont.

It is stated that the Grand Trunk Ry. Montreal, are negotiating for control of Rutland Ry. and will establish terminal at Prescott.

Prince Rupert, B.C.

Dominion Government plan to erect three wooden pile wharves, one at De Watla Bay, Graham Island; one at Stewart, Portland Canal; one at Refuge Bay, Porcher Island. Cost $15,000.

Toronto, Ont.

Plans are in progress for subway to cost $15,000, Scarlet road, Tp. York, for Canadian Pacific Railway, Union Station. Engineer, District Engineer Hertzberg, Union Station, Toronto.

The estimates provide for the construction of a concrete bridge to cost $30,000, Shaw street ravine. A similar bridge is contemplated for Crawford street.

Estimates have been prepared for works department, $2,565,810, divided as follows: Works Dept., $539,821; bridges, $325,215; pavements, $51,752; special works, $36,250; sewers, $145,200; new mains, $281,519; intake repairs, $125,000; high pressure mains, $76,000; new press house equipment, $80,000; new plant, $7,050; water works maintenance, etc., $392,930; meters, $100,000; 2 new 15 million gal. pumping engines, $350,000; intake repairs, $125,000; high pressure mains, $76,000; new press house equipment, $80,000. Mayor, G. R. Geary; Engineer, C. H. Rust.

Weyburn, Sask.

Tenders are called for freight shed to cost $25,000, for Canadian Pacific Railway. Architect, T. Martin, Divisional Engineer, Moose Jaw. 1-storey, frame, shingle roof. Tenders received by Div. Eng. until Feb. 20, 1912.

Windsor, Ont.

Plans will be prepared for bridge for Canadian Pacific Railway. Address, Supt. Geo. W. Hodge, London. Work to be done at once.

Winnipeg, Man.

The Board of Control has been instructed to call for tenders for construction of permanent approaches to Louise bridge. Cost $7,000. Engineer, Col. N. F. Ruttan, 223 James avenue.

CONTRACTS AWARDED

Calgary, Alta.

Steel contract for steel bridge across Bow River has been awarded to Algoma Bridge Co., Winnipeg, Man., for $64,300. City Engineer, J. T. Child.

Lacolle Junction, Que.

Steel superstructure for bridge across Richelieu River, for Grand Trunk Ry. Co., Montreal. Steel work, Dominion Bridge Co., Lachine, 600 tons of steel. Bridge to have 12 60-ft. deck spans and a 250-ft. swing section and 18 ft. wide for single track.

Montreal, Que.

Car barns and power house for Montreal & Southern Counties Railway Co., 606 Canadian Express Bldg., Montreal. Contractors, Byers & Anglin, 65 Victoria street, Montreal. 2-storey, 205 x 85; brick and concrete, steel frame, 4 track. Power house, 85 x 60, and similar construction. Work to be finished by May. Electrical installation contract not yet awarded.

St. John, N.B.

Harbor improvements to cost $7,500,000, for Dominion Government. The Norton Griffiths Co., St. John, N.B., have secured contract for Courtenay Bay harbor improvements, etc., at $7,500,000. Work to be completed in four years. An additional dry dock contract is contemplated involving $4,000,000.

Public Buildings, Churches, Schools, etc.

Berlin, Ont.

Debentures will be issued for concrete grand stand to cost $20,000. Address, Finance Committee. Work will be completed this year.

Brantford, Ont.

Plans are being prepared for library extension to cost $10,000, for Public Library Board. Architect, L. D. Barber, Brantford. If plans are approved tenders will be called in about a month.

Burlington, Ont.

Tenders will be called for school to cost $35,000. Architects, Munro & Mead, Hamilton. 9-room, 2-storey, 80 x 80, brick and stone, stone foundation, electric lighting, tar and gravel roofing, steam heating, electric work, lavatories, ventilating system, electric bells, hardwood finish. Tenders open in about a month. Burlington School Board: chairman, F. H. Cleaver.

Calgary, Alta.

Engineer, Mr. Brown City Commissioners recommend that by-law be submitted to ratepayers to spend $40,000 on police signal system. 60 patrol boxes will be required.

Tenders will be called shortly for University to cost $500,000. Secretary, H. W. Riley, Calgary. Address, Dr. Blow, 7th avenue, Calgary. Work will commence early in the spring.

The Calgary School Board recommend that 2 schools be built, one in North Calgary and one in Tuxedo Park.

Fredericton, N.B.

Plans are under way for Post Office and Customs Building on Queen street. Dept. of Public Works, Ottawa. Secretary, R. C. Desrochers. Mr. C. D. Sutherland, Ottawa, is making arrangements for construction.

Goderich, Ont.

Tenders will be received until March 15th for construction of coal house, 32 x 35, at gaol. Specifications at office of clerk, W. Lane. Chairman of Com., Dr. W. F. Clark.

Hamilton, Ont.

F. Guest, 12 Garth street E., is contemplating the erection of a motion picture theatre to cost $10,000, cor. Barton and Leeming streets. Architect, Not appointed yet.

New tenders are called for alterations to City Hall to cost $20,000. Mayor, Geo. H. Lees. Architect, Mills & Hutton, Bank of Hamilton Bldg., Hamilton.

Hanover, Ont.

A site has been purchased and work will start in the spring on the erection of a new post office to cost $25,000. Department of Public Works, Ottawa. Secretary, R. C. Desrochers.

Keady, Ont.

Tenders are called until March 4th for the erection of a school for School District No. 7, Sullivan, Ont. Secretary, Robert McClelland, Ont., Lot 4, Con. 12, Sullivan, Ont. Plans and specifications with secretary.

Kingston, Ont.

Tenders will be received until March 6th for construction of dormitory in connection with Royal Military College. Plans with architect and at Dept. of Public Works. Architect, Power & Son, Kingston. Secretary, R. C. Desrochers.

Tenders are called until Feb. 29th for alterations to following public schools: Cataraqui, Louise, Sydenham and Rideau. Architect, Arthur Ellis, Kingston. Masonry, carpentry, plumbing, heating, painting and glazing. Plans, etc., at office of the Secretary, corner Princess and Sydemham streets.

Kindersley, Sask.

The Municipal Skating & Curling Club plan to erect a new rink at a cost of $6,000.

Lachine, Que.

Plans are to be prepared shortly for large municipal hall.

London, Ont.

The council will consider offers for site for new City Hall this week to cost $200,000.

Plans will be prepared for new school. Architect, Nutter. New equipment, seating, heating, blackboards and supplies will be needed. City architect to pre pare plans for new building to replace Aberdeen School.

Maisonneuve, Que.

Tenders are called for Girls School to cost $140,000 for Catholic School Commissioners. Architect, C. A. Reeves, 58 St. James street. 3-storey and basement, 186 x 70, stone and brick, on steel frame, concrete foundation, hot water heating, electric and gas lighting. Tenders called by architects, to close Feb. 29, 1912.

Niagara Falls, Ont.

The council is petitioning Government for permanent battery of artillery. If granted new gun house will be built. Mayor, C. C. Cole, Niagara Falls. Clerk, W. J. Langmuir.

North Bay, Ont.

Plans are being prepared for public school to cost $25,000. Architect, H. W. Angus, North Bay. Two-storey, 62 x 90, stone, solid brick, steel, stone foundation, electric lighting, steam heating, felt and gravel roof, hardwood floors, fire escapes. Tenders received by architect after March 1st.

Ottawa, Ont.

The Associated Unions have purchased a site for the erection of a Labor Temple. Work will be started this season.

Tenders will be called for Orphans' Home, Wellington street, for Salvation Army, Ottawa. Architect, Horwood & Taylor, Sparks street, Ottawa. Three-storey, stone and brick, stone foundation, electric lighting. Permit not granted yet.

Preston, Ont.

Plans will be prepared for addition to school to cost $10,000. Building committee, W. Hudson and D. M. Campbell Preston. Architect, J. H. Mickler, Preston. Power Engineer, H. G. Legg. 4-room addition, steam heating, cut stone, slate roof, reinforced concrete flooring.

St. Thomas, Ont.

It is likely new by-law will be prepared to authorize erection of both General and Isolation Hospitals. Present by-law calls for $10,000 expenditure.

Saskatoon, Sask.

Tenders are called for plumbing, heating, etc., building for Young Men's Christian Assn. Architect, D.W. F. Nichols, 445 Main St., Winnipeg, Man. Associate Architects, Thompson, Daniel & Colthurst, Saskatoon, Sask. Received until March 8th for all trades, in connec tion with superstructure.

Sault Ste. Marie, Ont.

Funds are being raised for new Y. M. C. A. building to cost $50,000.

Strathcona, Alta.

Plans have been prepared for hospital for Hospital Board, Strathcona. Architects, Wilson & Herrald, Strathcona. Pressed brick, Bedford stone, fireproof construction. Tenders to be called as soon as plans are approved by Board.

Sydenham, Ont.

Tenders are called until Feb. 29th for erection of a new church for St. Paul's Congregation. Pastor, Rev. T. F. Dowdell, Sydenham. Architect, Power & Son, Kingston. Plans, etc., at rectory or at office of architect.

Toronto, Ont.

The Independent Order of Oddfellows College and Yonge streets, Toronto, plan to erect Hall and Auditorium to cost $100,000, 229 College street. Architect, H. G. Paul, 395 College street, Toronto. 5-storey, 130 x 65, fireproof, brick and artificial stone, structural steel, marble, hardwood finish, skylights, fire escapes, fireproofing metal lath, plate & art glass, galvanized cornice, boilers, passenger elevators, reinforced concrete.

Appropriations of $760,000 have been voted by Board of Education for enlargement of Public School and $800,000 for new Technical school.

Tenders will be open in about a week for Club House to cost $70,000, near Long Branch, for Toronto Golf Club, Coxwell avenue. Architect, W. A. Langton, 82 King street E., Toronto. Brick, stone verandahs with tile flooring, green tile roofing, electric lighting, mantles and tiles, hardwood finish, fire proofing, refrigerators, kitchen equipment, 2½ storeys. Work to start in spring.

Tenders are open for Lodge Rooms to cost $18,000, Gerrard street, for Riverdale Masonic Hall, Gerrard street. Address Edwards & Saunders, 18 Toronto street. Tenders close Feb. 18, 1912.

Thorold, Ont.

Tenders will be called shortly for a new school for Thorold Public School Board, Thorold. Mayor, John Broderick.

Vancouver, B.C.

Plans have been prepared for Bible Society building for B. C. Bible Society, Vancouver. Architect, Claude A. Jones, Hutchinson Building.

Victoria, B.C.

Tenders are called for erection of a church for St. John's Congregation. Architect, W. Ridgway Wilson, Pemberton Bldg., Victoria. Brick and terra cotta construction. Tenders received by architect until March 5, 1912.

Welland, Ont.

The Associated Labor Union of Welland are contemplating the erection of a Union Labor Temple.

Tenders are called for erection of a church to cost $15,000, Division street, for Holy Trinity Congregation. Architect, A. E. Nicholson, St. Catharines. 1-storey, 45 x 125, stone, stone foundation, electric light, steam heating, slate roof, ash interior finish. Received by architect until March 12, 1912.

Weyburn, Sask.

It is proposed to erect a seminary to cost $60,000 for Methodist Church of Canada. Representative(Rev. R. H. Hamilton, Weyburn. Three buildings, school, dormitory and one for other purposes.

Weyburn School Board; secretary, J. C. Martin, Weyburn, plan to build a High School to cost $75,000. Brick and stone construction; class rooms and lavatories.

Whitby, Ont.

Provincial Asylum,Toronto, Queen st. west, have a site of 624 acres under consideration for a new building. Present site and buildings sold to Railways and Massey Harris Company.

CONTRACTS AWARDED

Berlin, Ont.

Hospital for Berlin & Waterloo Hospital Board. Chairman, Mr. Hughes. Architect, W. Grayson Brown. Masonry, Caspar Brown, $16,392. Plumbing. W. Kneil & Co., $5,945.

Calgary, Alta.

Church to cost $100,000 for Grace Presbyterian Church. Architect, Smith & Gemmell, 77 Victoria street, Toronto. Stone construction, 87 ft. 6 in. x 144 ft. 6 in., concrete foundation, electric lighting, steam heating, slate roof, organ and blower. Building superintendent G. C. Herbert. 933 8th avenue W. Gymnasium, supper rooms, Sunday School, church and gallery. Tower 160 ft. high.

Toronto, Ont.

The Porous Terra Cotta fireproofing contracts of the Earlscourt and Essex street schools have been awarded to Robert Bennett, contractor, Kingston road, Toronto, by the Board of Education.

Lodge Rooms, smoking and supper rooms to cost $9,000, Lansdowne ave., for Parkdale Assembly Hall, 4 Lansdowne avenue. Architect, W. H. Ratcliffe, 2188 Gerrard street. Masonry, Elgie & Page, 21 Havelock street; carpentry, R. G. Kirby, 539 Yonge street; 2 storeys, brick, concrete foundation, Terrano floors, tar and gravel roofing, lockers, cut stone, plate glass, skylights. hot water heating, 610 ft. rad.

Winnipeg, Man.

Motion Picture Theatre for Coliseum Theatre Co. Address John S. Leitch, 22 Traders Bank Bldg., Winnipeg. Contractor, Head & Shannon, Winnipeg. Stage fixtures, ornamental front, brick veneer, concrete foundation, electric ltg., steam heating. Tenders for interior fittings, etc., being received by J. S. Leitch.

Residences

Calgary Alta.

A permit has been granted for residence to cost $3,500, Sunalta street, for H. Cromier, 1628 14th avenue W. 2-sty., 22 x 28, frame construction, concrete foundation, electric lighting, hot air htg. shingle roofing, hardwood finish.

A permit has been granted for residence to cost $4,500, 14th avenue W., to E. Goodwin, 1315 14th avenue W. Two-storey, 22 x 50. brick veneer, concrete foundation, electric lighting, hot air htg., shingle roofing. hardwood finish.

Plans are being prepared for residence to cost $12,000, Crescent Heights, for T. Clouston, Calgary. Architect, Leo. Dowler, Alexander Corner. Two-storey, 40 x 38, brick construction, concrete foundation, electric lighting, steam heating, hardwood finish. Tenders received by architect.

A permit has been applied for to erect 2 residences, to cost $5,000, for W. H. McConnell, R. 12a, Dick Block. Contractor, Caunt & Weber, 1518 3rd Street east. Two-storey, 44 x 34, frame, concrete foundation, electric lighting, hot air heating, shingle roofing, hardwood finish.

Tenders are called for apartments to cost $60,000, 4th avenue W., for S. M Hartronft, 4th avenue W., Calgary. Architect, 100 x 50, brick, concrete foundation, electric lighting, steam heating, tar and gravel roofing.

Hamilton, Ont.

M. Levy will erect 25 frame residences in different parts of the city.

Tenders will be called for residence to cost $5,000, Spruceside avenue, for C.

H. Andrew. Architect, Stewart & Witton, Bank of Hamilton Bldg., Hamilton.

Tenders are asked for cement work, brick work, carpentry, plastering, plumbing, tinsmithing, furnaces, etc., required for the erection of 10 new houses. Address, Box 101, Spectator.

Red Deer, Alta.

Plans have been prepared for residence to cost $3,500, for Dr. R. Parsons. Address, First street South East. Two-storey, brick veneer.

St. Thomas, Ont.

Tenders will be called for residence to cost $3,500, for R. A. Fanning, 48 East street, St. Thomas, Ont. Architect, owner. Two-storey, 28 x 36, brick, concrete foundation, electric lighting, hot water heating, slate roofing. Tenders received at once by R. A. Fanning.

Toronto, Ont.

Plans are completed for 2 pair residences to cost $10,000, S.W. corner Burnfield avenue and Shaw street, for A. W. Pike, 49 Hepburn street. Architect, P. H. Finney, 43 Victoria street. 2½ storeys, semi-detached, brick, stone foundation, slate, tar and gravel roofing.

T. J. Bowen Co., 817 Dundas street, will build dwellings to cost $5,500, McKay avenue north side near Dufferin. Two-storey, brick, concrete foundation, tar and gravel roofing.

A permit has been granted for pair residences to cost $5,000, Empress Crescent, for M. Cooper, 5 Keele street, Toronto. 2½-sty., semi-detached, brick.

R. E. Rice, 117 Rose avenue, will erect a residence to cost $8,000, Spadina ave. Brick, shingle tar and gravel roofing, hot water heating, comb. lighting, hardwood finish, gas stoves, refrigerators, window blinds.

Plans are drawn for apartment house to cost $12,000, N.S. St. Clair avenue, for E. M. Shildrick, 158 Howard Park ave. Architect, L. Foulds, Leader Lane. 3-storey and basement, brick, tar and gravel roofing, concrete foundation, steam heating, structural steel, cut stone, Credit Valley stone, mantles and tiles, hardwood finish, stucco, concrete, plate and art glass.

Plans are in progress for 4 suite apartment house to cost $10,000, Rosedale. Architect, Harry Simpson, 82 King st. E. Brick, tar and gravel roofing, steam heating, stone trimming, mantles and tiles, hardwood finish, telephone system, refrigerators. Tenders called February 20th.

Plans are in progress for 4 residences to cost $16,000, St. Andrews Gardens, for W. B. Charlton, 140 Close avenue. Architect, Designing & Draughting Co., 36 Toronto street. Brick, stone foundation, hot water heating, mantles, tiles, hardwood finish, plumbing.

Plans are contemplated for 1 pair residences to cost $5,000, Rainsford rd., for R. M. Sherris, 278 Booth avenue, Toronto. Architect, J. Gladwin Hedges, 86 Clinton street; 2-storey, 32 x 40, solid brick, stone foundation, hot air heating, combination lighting, cut or art stone, mantles, tiles. Owner is builder. Tenders received by owner.

Tenders are open for 3 family apartments to cost $4,000, College st. S. side, for S. Ward, 98 Ossington avenue. Architect, J. V. Denike, 139½ Ossington avenue. Two-storey and basement, 20 x 80, brick, shingle, tar and gravel roofing.

A permit has been granted for residence and store to cost $3,500, Woodbine ave., for Edgar Laraway, 45a Woodbine Beach. Two storeys and attic, frame, tar and shingle roofing.

Tenders are open for apartment house to cost $15,000, West Side Admiral Rd., for G. Phillips, 586 Huron street, Toronto. 3-storey and basement, brick, brick foundation, concrete, tar and gravel roofing.

Tenders are open by owner for apartment house to cost $15,000, Ulster st., for R. Robson & Co., 144 Haverson st., brick and stone, cut and artificial stone, hardwood finish, plate and art glass, galvanized cornices: 2 storeys and basement.

Tenders are open for residence to cost $3,200, 374 George street, near Gerrard, for H. Reesor, Summerhill avenue. Architect, J. H. Stanford, Westmorland avenue. Detached brick, 2 storeys and attic.

Tenders are open for 2 pair residences to cost $8,000, Vernon avenue, for Jacobs & Rossin, 156 Maria street, Toronto. Attached brick, tar and gravel roofing.

Plans are completed for addition to residence to cost $3,500 for Thos. McLaughlin, 14 St. Mary street. Architect, David Moore, 344 Shaw street, Toronto. 2 storeys and attic, solid brick.

Plans are completed for 2 pair residences to cost $10,000, S.W. cor. Grandview and Logan avenue, for J. G. Vale, 82 Simpson avenue. Architect, P. H. Finney, 43 Victoria street. 2-storey, brick, shingle roofing, stucco.

Tenders are open for apartment house to cost $8,500, Indian Road, for Messrs. Sanderson, Spadina avenue, Toronto. Architect, J. H. Stanford, Westmoreland avenue. Brick, stone foundation, slate roofing, hot water heating, art stone, mantles and tiles, fire-doors, plate and art glass, asbestos materials.

Tenders are open for residence to cost $4,500, Westminster avenue, for Mr. Stewart, Stair Bldg. brick. Tenders open by owner.

Tenders are open for pair residences to cost $15,000, Sparkhill and Hampton avenue, for G. W. Dale, 65 Dearbourne street. Two-storey, semi-detached, brick.

A permit has been applied for to erect 4 pair residences to cost $15,000, N.W. cor. Sparkhill and Hampton avenue, for G. W. Dale, 65 Dearbourne avenue; 2-storey, semi-detached.

Plans are drawn for residence to cost $5,500, 262 Ontario street, for H. Fine, 12 Milan street, Toronto. Architect, S. A. Waggett, 61 Blucher street, Toronto. 2½ storeys, tar and gravel roofing.

Tenders are open for residence to cost $20,000, Rosedale, for A. J. Gough, 78 Roxborough avenue E., Toronto. Architect, H. Simpson, 82 King street E., Toronto. 2½-storey, tapestry brick, stone foundation, spanish tile roofing, hot water heating, combination lighting, refrigerators; mantles and tiles, hardwood finish, dimensions 75 x 60.

Vancouver, B.C.

Plans are prepared for apartments on Georgia and Hornby streets, for Dr. Robert Telford, 1010 Georgia street. Architects, W. M. Dodd & Co., Canadian Bank of Commerce, Vancouver. Ten storey, 132 x 132, concrete apartment house. Seven storeys to be built in spring.

Winnipeg, Man.

A permit has been granted for residence to cost $8,000, for W. T. Carson, 80 Sherbrooke street. 2½-storey, frame construction.

CONTRACTS AWARDED

Calgary, Alta.

Residence to cost $3,500, Royal Terrace, for W. R. Reader, 512 12th avenue W., Calgary. Contractor, R. Peach, 1512 26th avenue west, Calgary. 2-storey, 32 x 31, frame, concrete foundation, electric lighting, hot air heating, shingle roofing.

A permit has been issued for 2 residences, Royal, Sunalta, for Quick Sales Realty Co., McDougall Block. Builder, owner. 2-storey, 19 x 40, brick veneer, concrete foundation, electric lighting, hot air heating, shingle roofing, hardwood finish.

A permit has been granted for residence to cost $4,000, Parkdale, for Archibald & Gladwin, 9 Caledonian Block. Owner is builder. Two-storey, frame, concrete foundation, electric lighting, hot air heating, shingle roof, hardwood finish.

W. W. Duncan, 1925 5th ave. west, will build two residences, cost $5,000, Bankview. Two storeys, 18 x 36, frame, concrete foundation, electric lighting, hot air heating, shingle roof.

A permit has been granted to erect residence to cost $3,500, Hillhurst, for Fryers & Manzer, 1146 Sydenham road, Calgary. Two-storey, 24 x 28, frame, concrete foundation, electric lighting, hot air heating, shingle roof, hardwood finish.

Hamilton, Ont.

J. Bethune, Ryckman's Corners, will erect 18 residences on Sherman ave; 6 residences on Somerset avenue; 9 residences on Chestnut avenue. Contractor, James McNaught, 31 Fife street, Hamilton.

Montreal, Que.

Residence to cost $3,000, Strathcona street, for Geo. Bail, 365 Plessis street. Builder is owner. 2½-storey 24 x 32, brick, stone foundation, gas and elcetric lighting, hot water heating, gravel roof.

W. Pitre, 211 Bourbonniere street, is excavating for 6 flats to cost $6,000. Brick, 50 x 48, stone foundation, gas and electric lighting, gravel roof.

Three flats to cost $3,000, Old Orchard avenue, for Ludger Paiment, 74 Lacasse. Contractor, Nap. Brisebois, 64 Lacasse street. Three-storey, 25 x 42, pressed brick and wood, concrete foundation, electric light, stove heating, gravel roofing.

Excavation has started for 2 residences, Redpath Property, Mt. Royal, for James & David Law. Architect, H. Stone, 84 St. Francois Xavier street, Montreal. Excavation, Bishop Construction Co., Eastern Townships Bank Bldg., Montreal. Plans for residences have not been prepared yet. 3000 cubic yds. of rock excavation.

St. Victor de Tring, Que.

Priest's residence, to cost $20,000, for Roman Catholic Church, c/o M. le Cure, St. Victor de Tring, Beauce. General contractor, Joseph Poulin, St. Victor. Roofing, Leon Rousseau, Thetford

Mines. Brick, concrete foundation, gasoline lighting, hot water heating, galvanized iron or asbestos roofing; 2-storey, 44 x 44, and 30 x 36.

Toronto, Ont.

Summer Cottage, to cost $3,800, Centre Island, for C. Good, Russell Hill Drive. Architect, S. Smith, 30 Shannon street, Toronto. Builder, J. P. Hamlyn, 895 Dovercourt road. Two-sty., frame.

Residence to cost $4,500, Fairview Boulevard, for E. W. Bruce, 466 Gladstone avenue, Toronto. Builder, Eagle & Smith, 9 Dearbourne avenue, Toronto. 2½-storey, brick and stone.

Residence to cost $4,200, Lawes st., for A. Chisholm, 1703 Dundas street, Toronto. Architect, Simon Locke, Niagara Falls. Builder, T. P. Wright & Son, West Toronto. 2-storey, brick, structural steel, stucco, concrete floors, 460 ft. radiation.

Plans are completed for detached residence to cost $3,000, E. Side Crawford street, for J. E. Wainwright, 18 Beatrice street, Toronto. Architect, J. Gladwin Hedges, 86 Clinton street, Toronto. Builder is owner. Solid brick, stone foundation, slate roofing, hot water heating, combination lighting, cut stone, mantles, stucco, plastic relief work, plate and art glass, 17 x 45; 2 storeys.

Excavation has been started for four attached dwellings to cost $6,400, N.E. cor. Walnut and Defoe street, for H. Galbraith, 19 Major street.

Walkerville, Ont.

Residence to cost $20,000, for H. R. Dingwall. Architect, Burroughs & Wells, Detroit, Mich. Brick and stucco, stone or concrete foundation, electric light, hot water heating, shingle roofing. Contracts awarded to: Excavation and Masonry—H. Howe, Walkerville; carpentry, A. Mapes, Walkerville; painting—Interior Co., Detroit; plumbing and heating, O'Connor Bros., Detroit, Mich. roofing—A. Mapes, Walkerville; steel work—H. Howe., Walkerville.

Wolfville, N.S.

Residence to cost $5,000 for Dr. J. F Tufts, Wolfville, N.S. Builder, Chas. Wright, Wolfville, N. S. Wood and brick construction. To start in spring.

Business Buildings and Industial Plants

Barrie, Ont.

Plans have been prepared for garage and boathouse to cost $3,000, Kempenfeldt Bay, Lake Simcoe, for Howard Harris, Toronto. Architect, Eden Smith & Sons, 199 Yonge street, Toronto. Concrete foundation, pine flooring, siding, shingle roofing.

Calgary, Alta.

T. H. Estabrooks Co., Ltd., St. Johns, N. B., are contemplating the erection of a warehouse here.

Mr. Freeze, Parkview, is planning an addition to present store premises, at a cost of $6,000.

J. R. Irwin, 1122 6th avenue west, will erect a block of stores and apartments to cost between $15,000 and $20,000.

Tenders close March 6th for erection of new city stables, estimated cost $10,000. Engineer, J. T. Child.

Canada Malting Co. are asking for free site and exemption for their malting plant and a by-law will be voted on by ratepayers Feb. 29, 1912.

M. P. P. Roberts plans to erect two warehouses on 11th avenue west; 3-sty., 130 x 50. Cost $70,000.

Edmonton, Alta.

Tenders are called for office building for Canadian Pacific Railway, Winnipeg. Architect, W. W. Blair, 400 Nanton Blg., Winnipeg. Steel and brick construction, cut stone, tile partitions and arches, electric lighting. Received by architect until March 1, 1912.

Preparations are under way for 8-storey office building on Jasper avenue, for Canadian Pacific Railway, Edmonton. Agent, Charles H. Allen. 6 or 8-storey office building. Work to start in March.

Fort William, Ont.

Grand Trunk Pacific Ry. Co., headquarters, Montreal, Que., plan to erect a large grain elevator here with a capacity of 30,000,000 bushels.

Galt, Ont.

Tenders are called for factory buildings for Victoria Wheel Works, Galt. Architect, William Scott, 36 Chapman street, Galt. Received by architect until March 2nd, for all trades in connection with new factory building.

Hamilton, Ont.

Estimates are being prepared by Ruby Manufacturing Company, Jackson, Mich., for boat house for George Askew, Bay and Macauley streets. Fireproof, steel construction, 190 x 30 x 10 ft. high; 20 apartments, 10 x 10, with sliding doors.

Union Drawn Steel Co., President, A. McMahon, 181 Victoria avenue, are trying to purchase site for addition to steel mills. Work to be started in spring.

Plans are being prepared for remodelling hotel, for Cosgrave Hotel Co., corner Martin and Hughson street. Architect, C. J. Read, 404 Confederation Life Bldg., Toronto. Marble counters, fittings and lavatories, tile floors, etc.

The Board of Trade, President, H. L. Frost, cor. Main and Hughson street, and Messrs. T. J. Stewart and Samuel Parker, M.P.'s for Hamilton, are trying to induce Government to build cooling plant here.

Pears & Co., Toronto, have purchased Thos. Launders brick yards and may make important extensions. Cost, $25,000. Address, James Pears, Eglinton avenue west, Eglinton, Ont.

Competitive plans are being prepared for Bank and office building, for Bank of Nova Scotia. Address, Toronto Office, 30 King west. 6-storey bank and office building. Toronto office will choose architect.

Times Printing Co., President, R. B. Ferrie, are planning building extensions to their present building. Architect, Stewart & Witton, 2 Hughson street. New machinery will be installed.

H. L. Frost, president Hamilton Board of Trade, Main and Hughson streets, has announced that a large hotel will be built this year. Company has option on site. Estimated cost $1,000,000.

Kingston, Ont.

Buffalo-Ontario Smelting & Refining Co. have purchased property and building will commence in the spring on erection of a smelter. Company owns mining property in New Ontario.

London, Ont.

Plans are being prepared for biscuit factory to cost $250,000, for D. S. Perrin Co., London. Architects, Moore & Munro, London. Biscuit making, box making and candy making machinery required. Elevators, electric light and steam heating. Work to be rushed in spring.

Marysville, N.B.

The Consolidated Pulp and Paper Co., St. John, N.B., are reported to have taken over Gibson lands and plan to erect pulp mill with 50-ton capacity.

Montreal, Que.

Belgo Canadian Real Estate Co., 121 Board of Trade Bldg., will erect an office building on Bleury street to be same construction as adjoining Caron Building. Solid concrete, reinforced concrete.

J. E. Wilder, Montreal, represents a syndicate that intends building a 10-sty. business block in Montreal this summer. Company also intends advocating widening of Ontario street.

Plans are being prepared for alterations to stores for F. W. Gross, 407 St. Catherine street. Architects, House of Brown, 207 St. James street. New store front, and remodelled interior. Barber shop in basement. Architects will receive tenders.

Plans are being prepared for offices for Standard Realty Co., 1451 St. Lawrence Blvd. Architect, House of Brown, 207 St. James street, Montreal. One-storey, 92 x 52, Columbus brick, electric light, steam heating, gravel roofing, artificial stone. Addition of new storey. Tenders received by architect and close Feb. 22, 1912.

Plans are being prepared for remodelling office, St. James street, for Security Realties Limited, 207 St. James street, Montreal. Architects, House of Brown, 207 St. James street, Montreal. Premises to be remodelled to suit tenants. New decorating, hot water heating, electric lighting, passenger elevator. Tenders received by architects.

New Hamburg, Ont.

The New Hamburg Felt Boot Co. plan to build a 3-storey factory addition for manufacture of felt boots.

New Westminster, B.C.

The International Milling Co., President, F. A. Bean, have chosen a site of 10 acres at Fort Mann, B.C., for new flour mill.

Ottawa, Ont.

The British American Bank Note Co. directors have decided to build large extension on Wellington street in near future to cost $75,000.

Parkhill, Ont.

The Parkhill Lumber & Mfg. Co. are planning an addition to planing mill. Firm will manufacture small woodenware. Complete new machinery required. Plans are being prepared.

St. Thomas, Ont.

Gasoelectric Motors, Ltd., President, E. H. Thomas, plan to erect a motor factory. Two-storey, 100 x 200, cement and glass, cement foundation, steam heating, electric lighting, glass roof, cement floor, 2 elevators.

St. Boniface, Man.

Tenders will be received for stock yards for Union Stock Yards Ltd., St.

Boniface. Architects, Woodman & Carey, Free Press Bldg., Winnipeg.

St. Catharines, Ont.

E. D. Pitt, engineer and architect, 405 Victoria avenue, Niagara Falls, Ont., has prepared plans for a structural steel erecting shop, 78 x 228 ft., with concrete and tile gallery floors and roof and also fireproof japanning and impregnating building for the Canadian Crocker Wheeler Co.

Plans are being prepared for alterations to store to cost $3,000, for B. C. Fanfield, St. Catharines. Architect, T. H. Wiley, St. Catharines. Two-storey, 49 x 60, brick and stone, stone foundation, electric light, hot air heating, felt and gravel roofing, pine finish. Tenders received shortly by architect.

St. John, N.B.

The city is negotiating with Sugar Refinery Co., recently burnt out at Dartmouth, to build factory in St. John.

Dearborn & Co. are planning to remodel building on Prince William street into office. Work to commence at once.

Sarnia, Ont.

The Mueller Manufacturing Co., Decatur, Ill., manager, B. Mueller, will erect a brass goods factory here. Representative of company in Sarnia is preparing for start in the spring. The company will be incorporated as Canadian firm.

Southampton, Ont.

Knechtel Furniture Co. plan to erect a furniture factory to cost $10,000. Architect, Henry Grasser, c/o Furn. Co., Southampton. Four-storey, 68 ft. 6 in. x 99 ft., electric motors, elevator, woodworking machinery, sprinkler system.

Toronto, Ont.

Tenders are open for alterations to hotel to cost $12,000, cor. Front and Jarvis streets, for Robert McKenna, 82 King street E., Toronto. Mantles and tiles, terra cotta front, plumbing, plastering, painting and electric bells.

Plans are contemplated for store and dwelling, $5,000, Queen street near Hambly, for Andrea Simeon, 397 Yonge St. Architect, J. A. Boisoneau, 88 Wright avenue.

Tenders are open for garage to cost $6,000, W.S. Dundas street, for C .J. Powley, 66 Parkway avenue, Toronto. 1-storey, stone, stone foundation, tar and gravel roofing, structural steel. Gasoline tank required.

Tenders are open for addition to warehouse to cost $7,500, Richmond street west, for Rudd Paper Box Co., Richmond street west. Architect, Ashton Pentecost, room 1108 Temple building, Toronto. One-storey, brick, tar and gravel roofing.

A permit has been granted to erect stores and apartments to cost $18,000, 748 Yonge street, for Horace Blachford, 166 Carleton street, Toronto. 3-storey and basement, structural steel, skylights, art stone, sidewalk lights, reinforced concrete floors, fireproofing, metal sash, vaults, plate and art glass, ornamental iron, hollow tile columns, mirrors and fan-lights.

Tenders are open for warehouse to cost $20,000, Richmond and Duncan sts., for W. H. Phillips Co., Church and Court streets, Toronto. Architect, J. P. Hynes, 199 Yonge street. 3-storey and basement, brick and concrete, steam heating, structural steel, cut or art stone, fire escapes, machinery, galvanized cornice, freight elevator, cast iron post bases and caps, plumbing, tar and gravel roofing.

Tenders are open for 3 attached stores and dwellings to cost $7,000, N.S. Royce avenue, for J. L. Mitchell, 444 Markham street, Toronto. Architect, G. A. Waggett, 61 Bleeker street, Toronto. Brick and stone, tar and gravel.

Tenders are open for stores and apartments to cost $8,000, S.S. Queen street, for M. Granalstein, 488 Wellington W. Architect, J. Feldman, 199 Yonge street. Brick, 2 storeys and basement.

Tenders are open for garage to cost $6,000, Dundas street, for C. J. Pauley, 66 Parkway avenue, Toronto. One-sty., stone.

Vancouver, B.C.

Plans are being prepared for garages to cost $25,000, Hornby street. Architect, W. T. Whiteway, Molsons Bank Bldg., Vancouver. Owner, Harry Henlow. Concrete, steel, wire glass.

Welland, Ont.

Plans are being prepared for canning factory to cost $15,000, for J. Goodwillie. Architect, A. E. Nicholson, St. Catharines, Ont. Two sty., 130 x 96, hollow brick, reinforced eoncrete conc. fndns., electric lighting, steam heating, felt and gravel roof, concrete and wood roof.

Weyburn, Sask.

Tenders are called until March 1st for departmental store to cost $100,000, for N. D. Boyan. Fve-storey, 100 x 120, brick and stone, concrete foundation, electric lighting, steam heating, flat roof, oak interior finish, fire escapes, vault, ventilating system, sprinkler system, dynamos, motor, boiler, passenger and freight elevators. Tenders received by architect until March 1, 1912.

Windsor, Ont.

W. T. Cullen, 200 Majestic Bldg., Detroit, U.S.A., is organizing a company to erect a factory on McDougall street, 200 x 70. Cost $10,000.

Winnipeg, Man.

Plans are in preparation for office building, Portage avenue, between Hargrave and Carleton, for an English syndicate. Information may be had from Messrs. Oldfield, Kirby & Gardner, Winnipeg. Plans not yet completed.

Permission has been granted to Security Storage Co., Ltd., to build 1½-storey brick stable on west side McGee street, to accommodate 60 horses.

The city is contemplating the erection of a new scale building on Market Sq. to cost $4,125. Engineer, Col. Ruttan, 223 James avenue.

Woodstock, N.B.

Tenders to be called shortly for construction of brick warehouse, 60 x 100, for G. Clark.

George Boyes plans to erect a brick barn $6,000 to replace one destroyed by fire. Tenders to be called shortly.

CONTRACTS AWARDED

Brantford, Ont.

Addition to factory to cost $40,000, for Barber & Ellis, 71 Wellington street, Toronto. Architect, Curry & Sparling, 90 Yonge street, Toronto. Additions, 70 x 300 and 65 x 264. Contractor, P. H. Secord & Sons, Ltd., Brantford, were awarded foundation at $10,000. Remaining contracts to be awarded this week.

Calgary, Alta.

Warehouse to cost $60,000, 11th ave. W., for Nicholson & Bain. Architect, E. W. Croyston, Winnipeg. Contractor, McNeill & Framer, Box 14, Calgary. 6-storey, 110 x 50, brick, concrete foundation, electric lighting, steam heating, tar and gravel roof, laminated floors fire escapes, 2 freight elevators, steam plant.

A permit has been applied for to erect stores and apartments to cost $10,000, for E. A. Hayden, 1136 Kensington ave. 2-storey, 50 x 80, brick veneer, concrete foundation, electric lighting, steam heating, tar and gravel roofing, pine finish, steam boiler.

Foundations the in for 13-storey office building, for Canadian Pacific Railway Co., Montreal. Architect, E. & W. S. Maxwell, Beaver Hall Square, Montreal. General Contractor, P. Lyall & Sons Construction Co., Ltd., Montreal. Tenders for sub-contracts received by general contractor. 13-storey, 228 x 164, steel frame, terra cotta partitions, cut stone and face brick, concrete foundation, electric and gas lighting, steam heating, slate roof and deck tile roof, reinforced concrete floors.

A permit has been granted for a 13-storey office building. Contractor, Geo. A. Fuller Co., Montreal. Location, North-east corner of Main street and Lombard avenue.

Fort William, Ont.

Work is in progress on addition to grain elevator for G. T. P. Railway, Montreal. Contractors and Engineer, J. S. Metcalf Co., 54 St. Francois Xavier street, Montreal. 2,500,000 bus. section now being erected. Additional units to be added as required. Ultimate capacity 40 million bushels.

Harriston, Ont.

Cold storage warehouse to cost $8,000, for Wm. Davies Co., Toronto. Contractors, George Gray & Sons, Harriston. Converting old packing plant into cold storage warehouse.

Montreal, Que.

Office building, cor. Notre Dame and McGill streets, for McGill Street Office Building Co., Montreal. Architect, R. E. Bostram, 132 Board of Trade Building, Montreal. Engineers, Purdy & Henderson, 132 Board of Trade Building, Montreal. Steel work, Dominion Bridge Company, Lachine.

Excavation has started for 2 flats to cost $8,000, for Ludger Naud, 168 Gauthier street. Builder is owner. 3-storey, 25 x 90, brick veneer, stone foundation, gas lighting, hot water heating, gravel roof.

A. Schwoerer & Sons, 530 East 80th street, New York, have been awarded the contract for the roofing and sheet metal work required on the Ritz Carlton Hotel here. Geo. A. Fuller Co., general contractors. Warren & Wetmore, architects.

Ottawa, Ont.

Warehouse, Bank street, for Messrs. Parsons & Co. (Chinaware), Bank st., Ottawa. General contractor, R. J. Mackaw, 19 Archibald street, Ottawa. Three-storey, solid brick, electric lighting, elevator.

Port Alberni, B.C.

Hotel for A. E. Waterhouse, Sonass Hotel, Victoria, B.C. Builders, G. C.

(Continued on page 70)

Tenders and For Sale Department

To Architects and Engineers

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

Tenders for Steel Bridge

Tenders will be received up till 2 p.m., March **4th, 1912**, at Gilles Hill, for the erection of a Steel Bridge of one span, 70 feet, 16 ft. roadway, over North Branch of the Saugeen River, about 1½ miles from Chesley. Also for the erection of two Concrete Abutments for the same, about 400 cubic yards.

Plans and specifications may be seen with James Warren, A. L. S., Walkerton.

An accepted bank cheque for $100 must accompany each tender.

The lowest or any tender not necessarily accepted. Address tenders to

S. K. EWART,
Chesley P. O., Ont.

February 14, 1912. 8-9

Corporation of the CITY OF WESTMOUNT

City Surveyor's Department

Tenders are invited for the construction of the following works:—

(A) Contract No. 13—Intercepting sewer, Western avenue.
(B) Contract No. 12—Paving of Western ave.

Drawings, general conditions, specification, schedule and form of tender can be seen at the City Surveyor's office on and after February 19, 1912.

Copies of drawings, general conditions, specifications, schedule and form of tender can be obtained on payment of fifteen dollars for each contract, which will be refunded on receipt of a bona fide tender and return of the aforesaid documents.

Sealed tenders marked with the respective contract numbers are to be deposited with the City Clerk, City Hall, Westmount, not later than twelve noon, March 11th, 1912.

Tenders will be opened by the Mayor sitting in public at 5 p.m., March 11th, 1912.

The Council does not bind itself to accept the lowest or any tender.

ARCH. CURRIE, C.E.,
City Surveyor.

8-10

COUNTY OF HASTINGS

Tenders for Concrete Mixer

Tenders are invited by the Corporation of the County of Hastings, for furnishing one concrete mixer. Same to be of the batch type, mounted on trucks, operated by gasoline engine, self-charging, automatic water supply and capable of handling not less than 8½ to 9 cu. ft. of unmixed material per batch. Specifications may be seen at the office of the Contract Record, Toronto, Ont., or at the office of the County Engineer, Belleville, Ont.

Tenders will be received up to noon of March 13th, 1912, by registered letter, plainly marked on outside of envelope "Tender for Concrete Mixer," addressed to A. W. Chapman, Esq., County Clerk, Belleville, Ont.

The lowest or any tender not necessarily accepted.

LUCIUS E. ALLEN, C.E.,
County Engineer.

9-10

Tenders and Designs for an Aqueduct

Canadian Pacific Railway Company

Department of Natural Resources Irrigation Branch

Sealed tenders, addressed to the undersigned and endorsed "Proposal for Brooks Aqueduct," will be received up to noon of **May 1st, 1912.**

The site of the work is about four miles southeast of Brooks, Alberta, a station on the main line of the Canadian Pacific Railway, 125 miles east of Calgary. The aqueduct is about 10,000 feet long and 54 feet maximum height, and is designed to discharge 910 cubic feet per second.

Tenders will be received based either on the design prepared by the Company's Engineer or on designs to be submitted by the bidder. The Engineer's design involves the furnishing and placing of about 23,400 cubic yards of concrete and 3,640,000 pounds of reinforcing steel, together with excavation and filling to the amount of 40,000 cubic yards.

All labor and materials required will be at the expense of the Contractor.

Bidders will be required, either personally or by representative, to visit and inspect the site and satisfy themselves as to local conditions, supply of material, etc.

Plans, specifications and full information may be obtained on application to A. S. Dawson, Chief Engineer, Calgary.

A deposit of $300 will be required before plans or specifications will be given out, which will be returned on receipt of the same in good condition.

All proposals must be accompanied by a certified cheque payable to A. S. Dawson, for five per cent. of the amount of the tender, to be forfeited as liquidated damages in case the bidder neglects or refuses to enter into a contract should the work be awarded to him.

Proposals will not be considered unless made on the form provided. Interlineations, alterations or qualification prices, except as therein provided for, may invalidate porposals.

The Company reserves the right to reject any or all tenders and to waive defects.

A. S. DAWSON,
Chief Engineer,
Department of Natural Resources,
Canadian Pacific Railway.

Calgary, Alta., March 1, 1912. 9-12

CITY OF MOOSE JAW, SASKATCHEWAN

Tenders for Steam-Electric Machinery

Sealed tenders will be received by the City Commissioners, Moose Jaw, Saskatchewan, Canada, up to 10 a.m., **March 30th, 1912**, for the following:—

Contract "A"—One 1,500 K.W. A.C. Steam Turbo-generating set.

Contract "B"—One 500 K.W. A.C. Generator, direct connected to Diesel Oil Engine.

Full particulars and specifications can be obtained on application to J. D. Peters, Electrical Superintendent.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT, City Commissioners.
W. F. HEAL,

9-11

TOWN OF OSHAWA

Tenders For Street Paving

Sealed tenders will be received up to five o'clock p.m. of **Monday, the eleventh day of March, 1912**, for the construction of a Brick or Asphalt Block Pavement, on a Concrete Base, together with a Cement Concrete Curb and Gutter, approximately 25,000 square yards.

The Pavement will include that portion of the road occupied by the track of the Oshawa Street Railway.

Plans may be seen and specifications obtained at the Town Engineer's Office, Town Hall, Oshawa, Ont.

A certified cheque for five per cent. of the contract price much accompany each tender.

The lowest or any tender not necessarily accepted.

FRANK CHAPPELL,
Town Engineer.

Oshawa, Ont., Feb. 23, 1912. 9-10

City of Prince Albert

Sealed tenders, addressed to the City Commissioner and marked "Tenders for Cast Iron Pipe," will be received until noon on **Friday, the 8th day of March next** for the supplying of Cast Iron Water Pipe required by the City during the year 1912.

Pipe to conform to requirements of Canadian Society of Civil Engineers specifications Class "B."

Tenders to state price per ton for each size delivered in carload lots F.O.B. cars in Prince Albert, freight and duty paid. Subject to inspection and approval on delivery.

The following approximate quantities will be required:—

2,122 lineal feet 10-in. Cast Iron Pipe.
7,982 lineal feet 8-in. Cast Iron Pipe.
16,570 lineal feet 6-in. Cast Iron Pipe.

Thirty per cent. of the above quantity must be delivered on or before the 30th day of April, 1912, and the remainder on or before the 31st day of May, 1912.

(Signed) C. O. DAVIDSON,
Secretary-Treasurer.

9-10
February 17th, 1912.

CITY OF PORT ARTHUR

Notice

Sealed separate tenders, endorsed on envelope "Tender for Waterworks and Board of Works Material," will be received by the undersigned up to 6 o'clock p.m. of **Monday, March 11th, 1912**, for the supply and delivery F.O.B. City Warehouse, of the undernoted material:

Item No. 1. **SEWER PIPE**

2,000 ft. 20-in. No. 1 Salt Glazed Sewer Pipe.
3,000 ft. 12-in. No. 1 Salt Glazed Sewer Pipe.
2,000 ft. 10-in. No. 1 Salt Glazed Sewer Pipe.
2,000 ft. 6-in. No. 1 Salt Glazed Sewer Pipe.
1,000 ft. 4-in. No. 1 Salt Glazed Sewer Pipe.
100 pieces 6 x 4 in. Reducers (Bell End 4-in., Spigot End 6-in.).
25 pieces 6 x 6 x 6 in. Tees.
5 pieces 8 x 8 x 8 in. Tees.
5 pieces 10 x 10 x 8 in. Tees.
10 pieces 4-in. x 1/8 Tile Bends.
40 pieces 6-in. x 1/8 Tile Bends.
5 pieces 4-in. x ¼ Tile Bends.
5 pieces 6-in. x ¼ Tile Bends.
5 pieces 10 x 8 Sewer Pipe Reducers (Bell End 8-in.).

Parties tendering on Item No. 1 should quote price per foot for sewer pipe, and price each for all fittings.

Item No. 2.
50,000 Hard Brick, suitable for Manholes and Catch Basins.

Item No. 3.
150 Barrels of Cement to be delivered on or before May 10th, 1912.

Item No. 4.
1,000 lbs. Jute Packing (1-in. x 36 Strands), (bidders to quote price per lb. and submit samples).

Item No. 5.
Ten tons Pig Lead.

Item No. 6.
Five tons ½-in. No. 6 Lead Pipe.
Five tons 5/8-in. No. 8 Lead Pipe.

Item No. 7.
75 only 5-ft. lengths, 4-in. Extra Heavy Soil Pipe (One Bell).

Item No. 8.
4 doz. Tee Handles, Round Mouth Jones Shovels.
1 doz. Tee Handles, Square Mouth Jones Shovels.
4 doz. Pick Handles.
2 doz. No. 8 Rock Picks.
2 doz. 18-in. Stable Brooms.
2 kegs 6-in. Wire Nails.
4 kegs 4-in. Wire Nails.

Item No. 9.
200 bars ½-in. sq. iron cut, 5 ft. 6 in. long.
50 bars 5/8-in. sq. iron cut, 5 ft. 6 in. long.
500 No. 3/4-in. x 3/8-in. Iron.

Item No. 10.
100 pieces 2-in. x 6-in. x 12-ft. White Pine, dressed on one side and edge.
50 pieces 2-in. x 8-in. x 12-ft. White Pine, dressed on one side and edge.
50 pieces 2-in. x 12-in. x 12-ft. White Pine, dressed on one side and edge.
25 pieces 2-in. x 4-in. x 14-ft. White Pine, dressed on one side and edge.
10 pieces 3-in. x 10-in. x 16-ft. rough.
10 pieces 3-in. x 12-in. x 16-ft. rough.
10 pieces 3 in. x 10-in. x 14 ft. rough.
10 pieces 3-in. x 12-in. x 14-ft. rough.
10 pieces 3-in. x 12-in. x 12-ft. rough.

Item No. 11.
125 ½-in. Mueller Pat. Main Cocks, D5051.
60 ⅝-in. Mueller Pat. Main Cocks, D5051.
10 1-in. Mueller Pat. Main Cocks, D5353.
175 ½-in. Mueller Pat. Main Cocks, D5353.
20 ½-in. Lead Flange Union Couplings, Mueller Pat. D5001.
10 ½ in. Lead to Iron Couplings, Mueller Pat. D5002.

Item No. 12.
50 only, Manhole Castings, complete with lids.
20 only, Valve Chamber Castings, complete with lids and plugs.
30 only, Catch Basin Castings, complete with lids.

These are to be supplied as per City of Port Arthur Pattern of 1912, with properly fitted lids. The Manhole and Valve Chamber Castings should weigh about 430 to 450 lbs. each. Bidders should quote price for each complete casting; or price per lb. with approximate weight.

Parties tendering will quote prices per Unit.

All material to be delivered F.O.B. to the City Store-House, Front Street.

A marked cheque for 10 per cent. of the estimated amount of contract must accompany each tender.

Further instructions as to specifications and form of tender may be obtained from Mr. J. J. Hackney, Utilities Commissioner, at his office in the Municipal Building.

Delivery on or before May 1st, 1912.

The lowest or any tender not necessarily accepted.

J. McTEIGUE, City Clerk.
Corporation Office, Port Arthur,
February 19th, 1912. 9-10

CITY OF SASKATOON

Tenders for Supplying Portland Cement

Sealed tenders, addressed to the City Commissioners, and endorsed "Tender for supplying Portland Cement," will be received up to twelve o'clock noon on **Friday, March 15th, 1912**, for the supplying of approximately 5,000 barrels of Portland Cement.

The Corporation reserves the right to reject any or all tenders. All information may be obtained on application to George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., Feb. 22, 1912. 9

Tenders Wanted

Pumping Engine

Sealed tenders addressed to T. W. Brooke, Esq., Chairman, Water Commissioners, Windsor, Ont., and marked "Tender for Pumping Engine," will be received by the undersigned up to 12 o'clock noon, on **Monday, the 18th day of March, 1912.**

Proposal No. 1.

For the building and installing of one Horizontal Cross Compound, High Duty Crank, and Fly-Wheel Condensing Pumping Engine, having a capacity of five million Imperial gallons in 24 hours against a domestic pressure of 50 lbs. per square inch, or a fire pressure of 110 lbs. per sq. inch, with 100 lbs. steam at throttle.

Proposal No. 2.

For the building and erection of a Pump, having a capacity of eight million Imperial gallons in 24 hours, under similar conditions and specifications as contained in Proposal No. 1.

Each tenderer will furnish his own plans and specifications.

Time required to complete the work, including installing, must be stated in the tender. A certified cheque payable to the order of the Water Commissioners equal to 10 per cent. of the amount of tender must accompany each tender, which cheque in the case of an unsuccessful tenderer will be forthwith returned, but in the case of the successful tenderer will be retained until a satisfactory bond for the due performance of the work is executed, or if such successful tenderer for any reason neglects or refuses to execute a satisfactory bond within 15 days after his tender is accepted by the Water Commissioners, said cheque will be cashed and the expense of re-advertising the work required and any additional cost of building and installing said Pumping Engine over the amount of his tender will be retained from the proceeds of such cheque.

The right is reserved to reject any or all tenders.

THE WATER COMMISSIONERS,
W. A. Hanrahan, Secretary.
Windsor, Ont., Feb. 15, 1912. 8-10

CITY OF PRINCE ALBERT

Tenders for Sewer Pipe

Sealed tenders addressed to the City Commissioners and marked "Tenders for Sewer Pipe," will be received until noon on **Friday, the fifteenth day of March next**, for the supplying of sewer pipe required by the City during the year 1912.

Material to be first quality in every respect, and subject to inspection and approval on delivery. A sample of the material proposed to be furnished shall be submitted with the tender.

Price to be F.O.B. Cars, Prince Albert, freight, duty, and breakage included.

The following approximate quantities will be required:—

Size	Standard Length Straight Pipe	Y. Junctions	Bends	Slants
24-in.	3,353 lin. ft.	137		
18-in.	1,770 lin. ft.	10		
15-in.	5,812 lin. ft.	160		
12-in.	3,121 lin. ft.	49		
10-in.	6,108 lin. ft.	171		
8-in.	21,327 lin. ft.	800	30	
6-in.	3,000 lin. ft.	60	50	180
4-in.	6,000 lin. ft.		150	

Twenty per cent. of the above quantity must be delivered on or before the 30th day of April, 1912, and the remainder on or before the 3rd day of May, 1912.

Further orders will be placed for carload lots and delivery is to be made thirty days from date of receipt of order.

C. O. DAVIDSON,
Secretary-Treasurer.
Dated at Prince Albert, Sask.,
February 20th, 1912. 9-10

CITY OF TORONTO

Supply of Rail, Ties and Fastenings

Separate tenders on prescribed forms will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, up to noon on **Tuesday, March 19th, 1912**, for the supply of the following:—

1. 250 tons 45-lb. "T" rail, A.S.C.E. section.
2. 100 kegs 5-in. x 9/16-in. spikes.
3. 1,400 pair angle bars for 45-lb. "T" rail.
4. 24 kegs ¾-in. x 3-in. bolts.
5. 810 tons 80-lb. "T" rail, similar to Lorain Section 335.
6. 972 tons 90-lb. girder rail, similar to Lorain Section 392.
7. 1,100 pair splice bars for Lorain Sec. 335.
8. 1,250 pair splice bars for Lorain Sec. 392.
9. 60 kegs 1-in. x 3-⅝-in. track bolts and nuts (200 lbs. per keg).
10. 5,300 pair of ⅞-in. x 5 ft. 3¼-in. steel tie rods.
11. 6,000 steel ties and necessary rail fastenings.
12. 4,000 wood ties 5-in. x 6-in. x (6 ft., 7 ft., 8 ft. long).

Specifications and form of tender may be obtained on application to the Department of Railways & Bridges, City Engineer's Office, Toronto.

Envelopes containing tenders must be plainly marked as to contents.

Prospective tenderers will please only ask for the specifications covering those items on which they propose to tender.

Quick delivery will be required on Items No. 1, 2, 3, 4 and 12.

The tenderers shall submit with their tenders, the names of two sureties (approved of by the City Treasurer, not Members of the City Council or Officers of the Corporation of the City of Toronto) or in lieu of said sureties, the bond of a guarantee company approved of as aforesaid.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman of the Board of Control.
City Hall, Toronto,
February 26th, 1912. 9-10

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. Chicago, Ill.

FOR SALE

Centrifugal Pump

For Sale—Practically new, Centrifugal Pump, 4-in. Suction, 3-in. Discharge; driven by Double Cylinder, 2 Cycle Gasoline Engine, direct connected, and complete Rubber Hose and Piping necessary. In service only a few months; guaranteed in first class condition.

Address W. G. GIBSON,
9-11 Box 112, Port Hope, Ont.

For Sale

Electric light machinery in first-class running condition.

One Goldie & McCulloch 50 H.P. Engine.
One 60 H.P. Boiler.
One 60 K.W. 125 Cy. Dynamo and Exciter.

Reason for selling now using Hydro-Electric power.

No reasonable offer refused.

J. H. TAYLOR,
Sec. W. P. & L. Com.,
8-9 Weston, Ont.

Plant For Sale

One No. 4 stone crusher, jaw; capacity, 10 tons per hour.
One 30 horse power upright boiler.
One 30 horse power Leonard Clipper engine.
One 12-ton road roller.

The entire plant has only been used one season, in all about four months, and is in first-class condition and ready to go to work as soon as fittings could be placed. Immediate delivery, as the plant has not been working since last August. For full particulars and terms apply to

R. E. GILLESPIE,
McGill College Avenue,
8-11 Montreal, Que.

Concrete Bridges

Sealed tenders addressed to William Purves, Township Clerk, Columbus, Ont., will be received up till noon on Monday, March 18th, for the construction of twelve reinforced concrete bridges in the Township of East Whitby.

The lowest or any tender not necessarily accepted.

For plans and specifications and other information apply to

H. GIFFORD, Reeve,
Cedardale, Ont.
BOWMAN & CONNOR, Engineers,
9-10 36 Toronto Street, Toronto.

Situations Vacant

Advertisements under this heading two cents a word per insertion. Box No. ten cents extra. Minimum charge 25 cents

Engineer Wanted

The Town of Brockville requires the services of an engineer for general municipal work. Applications, giving age, experience, references and salary expected, may be addressed to John A. Mackenzie, Chairman Board of Works, Brockville, Ont. 9-10

Business Buildings and Industrial Plants

(Continued from page 67)

Mesher & Co., Victoria, B.C. 200 rooms. Work will begin in March.

Quebec, Que.

Contract is awarded for refrigerator plant (apartments), 144 Grand Allee, for Grand Allee Apartment Co. Ltd., Quebec. Architects, McDowell & Henderson, Montreal. Refrigerator Equipment, Sanderson Harold Co., Paris, Ont.

Toronto, Ont.

Robert Bennett, contractor, Kingston road, has been awarded the contract for porous terra cotta and fireproofing required for the new Bell Tedephone Building on Logan avenue.

Wells & Gray, Ltd., 315 Confederation Life Bldg., Toronto, have been awarded the contract for the construction of a cold storage warehouse for the Swift Canadian Co. at West Toronto. Total cost will be approximately $200,000.

Power Plants, Electricity and Telephones

Acton, Ont.

By-law to equip municipal station, to build power line and take power from Hydro-Electric passed. Town to spend $8,500.

Calgary, Alta.

By-law to raise $360,000 by way of debentures for further equipping Municipal Light & Power System carried.

Address City Clerk, Jas. Barnes.

Trenching gas main to cost $350,000, Calgary to Bow Island, 208 miles, for Western Light, Heat & Power Co., Calgary. Solicitor for company, W. H. McLaws, Calgary. W. F. Cochrane. Pittsburg, 85 miles. J. Driscoll, Indianapolis, 85 miles. Line to follow C. P. R. right of way.

Carillon, Que.

Tenders are called for equipment for Hydro-Electric plant at Carillon Falls, for National Hydro-Electric Co., Montreal. President, Arthur Lyman, Montreal. Engineers, A. D. Watts and Mr. Bergman, Montreal. Contractors, Carillon Construction & Development Co., Montreal.

Dover Township, Ont.

Ex-Warden Rankin, Dover, Ont., and Ed. Fleming, Dover, have in hand the installation of a new telephone system.

Edmonton, Alta.

Tenders are called for supply of telephone material. Department of Railways & Telephones; Deputy Minister, W. J. Harmer. Information on application to Supt. of Telephones. Received by Deputy Minister until noon, February 15th.

Fredericton, N.B.

A company is being formed to furnish power to villages in this vicinity. J. S. Armstrong, C.E., has asked Council for permission to erect and maintain transmission lines.

Hamilton, Ont.

Tenders are called until February 15th for Hamilton Hydro-electric Department. Engineer, E. J. Sifton, City Hall, for supply of meters and transformers.

Halifax, N.S.

Tenders will be received until March 4th by J. H. Winfield, for erection of brick and concrete telephone exchange building. Owner, Maritime Telegraph & Telephone Co. Gen. manager, J. H. Winifield, 88 Hollis street, Halifax. Architect, H. E. Gates, Halifax.

London, Ont.

Plans are prepared for power house for London Street Railway Company. Manager, C. B. King. Building to be built shortly and quantity of new power machinery installed.

Montreal, Que.

The Ambursen Hydraulic Construction Co. of Canada, Limited, 405 Dorchester street, west, Montreal, have closed contract with the Stadacona Hydraulic Co. of Quebec, P. Q., for the construction of 10,000 h.p. development on the Ste. Anne River, Severn Falls, P. Q.

Niagara Falls, Ont.

The Fire, Water & Light Committee authorized to purchase sixteen 45-hour alternating current arc lamps. Chairman of Committee, Ed. Davis, River Road.

Port Arthur, Ont.

The Municipal Building Committee recommended new telephone exchange in preference to extension of present one; estimated cost $70,000. Referred to Utilities Committee for consideration. J McTeigue, Clerk.

Saskatoon, Sask.

Tenders are called until March 8th for electrical equipment. Five 500 B.H. P. water tube boilers. Five sets automatic stokers, with induced draft plants and duplicate fans for same. Economizers for 2000 h.p. capacity. Two feed pumps and equipment. One 2000 kw. high pressure steam turbine with condenser, air pumps and apparatus. Two 75 kw. turbine exciters. One generator panel. Two exciter panels, with necessary cables and apparatus from turbine to switch-board. City Commissioners Jas. Clinkskill, W. B. Neil, E. M. Snell.

Wingham, Ont.

Plans will be prepared for power plant for stone works for Western Foundry Company, Wingham. Manager, J. S. Cunningham, Wingham. New machinery, wiring, switchboard and equipment required.

Winnipeg, Man.

Tenders will be called shortly for three 50 kw. transformers, 1,300 volt to 2,400 volt, 200 h.p., variable speed motors, required in reconstruction. Secretary, Board of Control, M. Peterson.

Building Permits

John McRae, 800 Powell street, 4-sty. brick store and rooming house, $25,000, 755-59 Powell street.

Geo. Arbuthnot, 1648 6th avenue west, 2-storey frame residence, $3,000, 1946 12th avenue west.

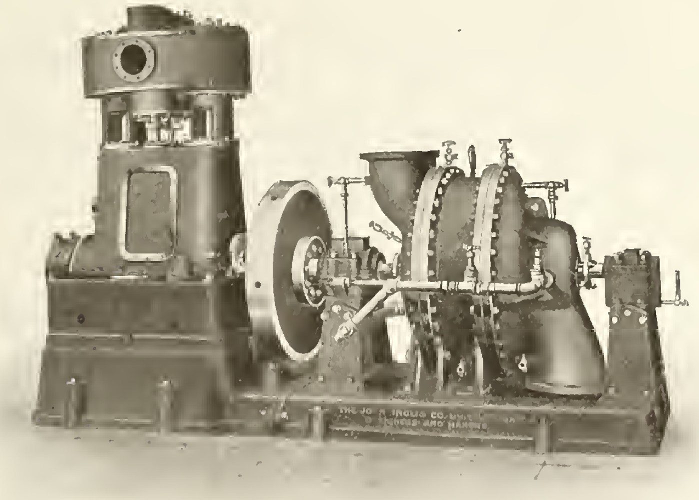
Bentley & Wear, 2042 Granville st., three 2-storey frame residences, $13,500, 2723-35 2nd avenue west.

A. Muir, 1004 11th avenue., 2-storey

(Continued on page 72)

Motor and Steam Driven Pumps

FOR TOWNS AND CITIES



6,000,000 Imperial Gallons per 24 hrs. 80 ft. head 475 R. P. M. Steam driven pump for city of Edmonton, Alberta,

"Inglis" Pumps give satisfactory results, because they represent the best in Engineering skill, workmanship, and design.

We manufacture Motor and Engine driven Turbine pumps to meet any requirement.

WRITE US FOR PROMPT INFORMATION.

The John Inglis Company
Engineers and Boilermakers Limited
14 Strachan Ave., TORONTO, Canada

frame residence, $6,000, 1126 15th avenue west.

A. Grossmon, 2-storey frame store and apartment, $7,000, 2165 Hastings street.

Swedish Lutheran Church, repairs to church $8,000, Princess and Pender sts.

T. A. Morris, 630 11th avenue, three 2-storey frame residences, $6,000, 1003-9 11th avenue east and 2630 Dock street.

Wm. Templeton, 3457 2nd avenue. 1½-storey frame residence, $3,000, 3427 2nd avenue west.

Business Notes

Middleton, N.S.

Residence and store of Crowe, Elliott Co., burned. Loss $30,000.

Midland, Ont.

Midland Terminal Railway Co. has applied to government for permission to extend from Midland to Coldwater, Ont. Solicitor, Thomas Gibson, Barrister, Traders Bank, Toronto.

Portage la Prairie, Man.

H. G. Hughes, pump works destroyed by fire. Loss $5,000.

St. Boniface, Man.

Sash and door factory of McCormick Mfg. Co., Ltd., burned. Loss $25,000. President, D. McCormick, St. Boniface, Man.

Sherbrooke, Que.

The McManaing Block, 121-129 Wellington street, burned. W. H. Griffiths, druggist, L. E. Chamberlain, boots and shoes, and others suffered. Loss, $25,000.

New Companies

The Canada Mainland Construction & Investment Corporation , Limited, has been incorporated with a capital of $500,000, to construct tramways, public buildings, wharves, etc., head office of the company to be Vancouver, B.C.

Okanagan Falls Lumber Company, Limited, has been incorporated with a capital of $25,000 to carry on business as general timber and lumber dealers, saw mill proprietors, &c., with head ofice at Okanagan Falls, B.C.

General Equipment Company, Limited, has been incorporated with capital of $50,000 to carry on business as civil engineers, designers and architects of all kinds of construction, to deal in machinery, building materials, &c., the head office to be at Montreal, and the incorporators are T. B. Gould, O. B. MacCallum, A. A. Magee and T. J. Coonan, all of Montreal.

The St. Denis Realties, Limited. has been incorporated with a capital of $100,000 to carry on business as a land and building company with head office at Montreal. The incorporators include the following: Patrick F. Brown, G. V. Cousins and S. T. Mains, all of Montreal.

Pacific Electric Heating Company has been incorporated with a capital of $100,000, to manufacture and deal in all kinds of electrical devices and appliances, etc., the head office is at Rooms 59-64 Davis Chambers, 615 Hastings street west, Vancouver, and R. R. McCrea is the company's attorney.

The British Columbia Power Company Limited, has been incorporated with a capital of $5,000,000 to operate and maintain electric works generating plant, power works, &c., with head office at Calgary, Alta. The incorporators are L. H. Miller, E. S. Day, and Thos. Rankine, of Calgary.

The North River Electric Company, Limited, has been incorporated with a capital of $90,000 to manufacture and deal in all kinds of electrical apparatus, to construct dams, bridges, power works &c., with head office at St. Andrews East, Que. The incorporators are: J. J. Meagher, W. S. Johnson and J. W. Weldon, all of Montreal, Que.

Point Comfort Lands Limited, has been incorporated with a capital stock of $760,000 to carry on business as constructors of bridges, roads, public buildings, &c., with head office at Montreal. The incorporators are E. R. Parkins, S. G. Dixon, and R. E. Allen, of Montreal.

South Shore Power and Paper Company, Limited, has been incorporated with a capital stock of $2,000,000 to carry on a lumber, timber and pulpwood business in all its branches and also to develop water powers, maintain and construct canals, reservoirs, docks, &c.. head office of the company to be in the city of Montreal, and the incorporators include Rene Chenevert, H. L. Mitchell and Percy Gregory, all of Montreal.

Dominion Tranfer Company Limited, has been incorporated with a capital of $50,000 with head office at Winnipeg to carry on business as builders of tramways, power houses, &c., to generate steam, gas, electric, water or other powers, &c. The incorporators are W. M. Gordon, J. A. Dack, and A. T. Bowes, all of Winnipeg.

Canadian Securities and Sales Company Limited, has been incorporated with a capital of $100,000 to construct, maintain and operate tramways, docks, harbors, piers, &c., with head office at Winnipeg.

Canadian Fire-Proofing Impregnation Company Limited, has been incorporated with a capital of $200,000 to deal in building supplies, &c. The head office to be at Winnipeg, and the incorporators are W. B. Forward, J. A. Kohlruss and Louis Meyer, of Southey, Sask.

Canadian Construction Company, Limited, has been incorporated with a capital of $50,000 to carry on a general building and contracting business with head office at Winnipeg. The incorporators are R. F. McMillan, R. D. Guy, and A. P. Scott of Winnipeg.

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220 King Street West - TORONTO

BANK OFFICE SCHOOL CHURCH & OPERA LODGE FURNITURE

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CANADIAN OFFICE-SCHOOL FURNITURE CO. LTD.

PRESTON - - - - - ONTARIO

Porous Terra-Cotta Fireproofing

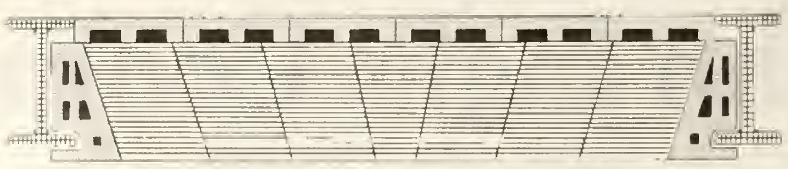
Floor Arching of Every Description

Roofing

Column and Girder Covering

Wall Furring and Partitions

Boiler Covering and Flue Linings



Type of Floor Arching—End Construction

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ROBERT BENNETT, - CONTRACTOR, Toronto

Telephone, Beach 4

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We build both plunger and electric elevators with patented improvements to secure better control and operation

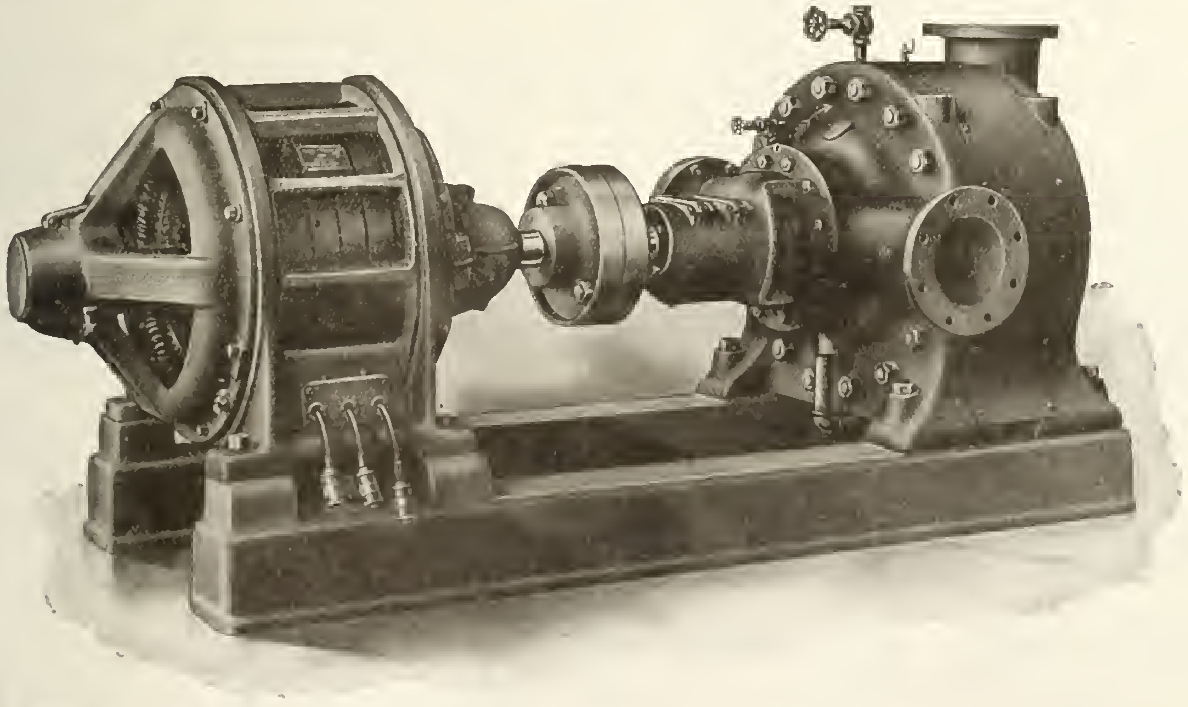
THE JOHN McDOUGALL CALEDONIAN IRON WORKS CO.

LIMITED

WORKS: 512 WILLIAM STREET, MONTREAL

Sales Offices: **MONTREAL TORONTO COBALT WINNIPEG CALGARY VANCOUVER**

Electrically Operated Turbine Pumps for All Duties



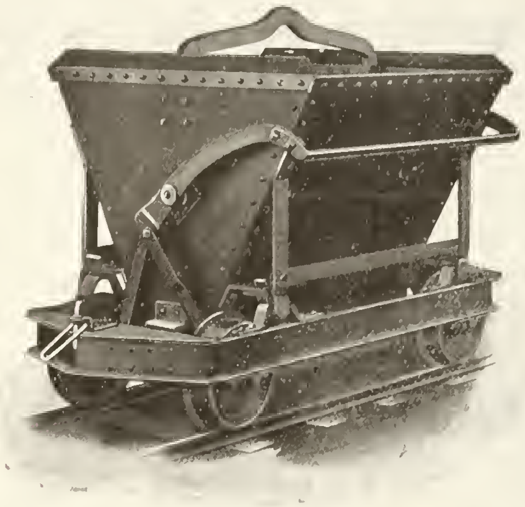
CANADA FOUNDRY COMPANY, Limited

TORONTO MONTREAL HALIFAX OTTAWA COBALT WINNIPEG CALGARY VANCOUVER NELSON

Doud's Bucket and Car

The advantage of this combination are time saving and no waste of material.

It is equipped with controllable discharge. Material may be deposited through the rails or the bucket may be lifted from the truck with ease.



THE

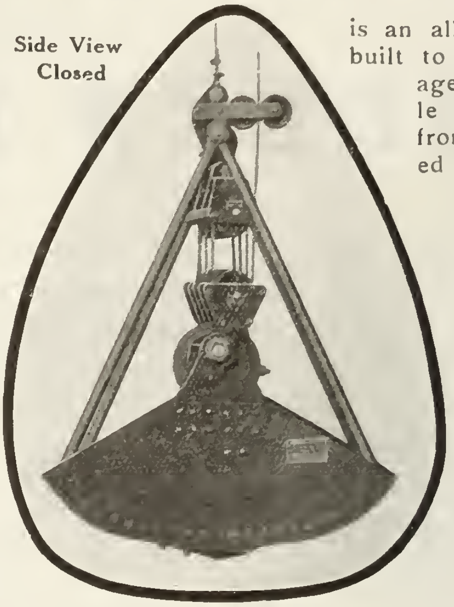
Acme Equipment & Engineering Co.

1032 Garfield Building, CLEVELAND, OHIO

These Buckets are made in Canada.

The

Owen Bucket



is an all round bucket, built to stand hard usage. It will handle any material from sand to crushed rock.

The Owen Bucket will dig like a steam shovel and is provided with detachable teeth for dredging.

Write for our catalogue fully descriptive and a positive guarantee with every bucket.

The Owen Bucket Company

529-531 Rockefeller Building

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PURE WATER

It is easy to obtain with our plants and apparatus

We design and contract for complete municipal filtration plants of any capacity.

We supply and install apparatus for sterilizing water supplies by the application of calcium hypochlorite.

Literature, Sketches, Estimates and Recommendations Supplied on Request

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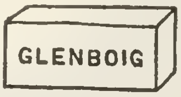
1001 Chestnut St., PHILADELPHIA, Pa.

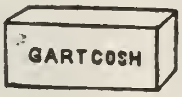
We have no affiliations or working acquirements with any of our competitors.

Perfect Castings

can be obtained only when a practically perfect fire-brick is used.



Every Glenboig Brick bears the brand



GLENBOIG

represent the highest degree of perfection in a fire-brick yet produced. To quote a famous English engineer: "Every improvement you make in the quality of your fire-bricks makes possible another advance in the practical science of metallurgy."

Our literature will interest.

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Alexander Gibb

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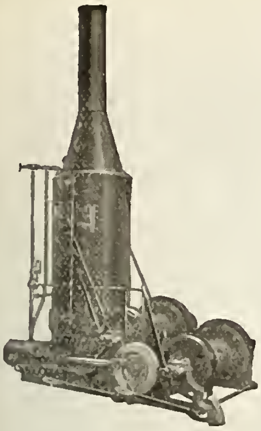

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It's a beauty, and the largest and best catalog of

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ever published in Canada.

And why should it not be the Best Catalog, for does it not describe the Best Hoisting Machinery made in Canada?

This book also shows a splendid assortment of Derricks and Derrick Parts, Steel Buckets, Steel Skips and Steel Cars, and many other articles used in connection with Hoisting Machinery.

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Makers of Hoisting Machinery

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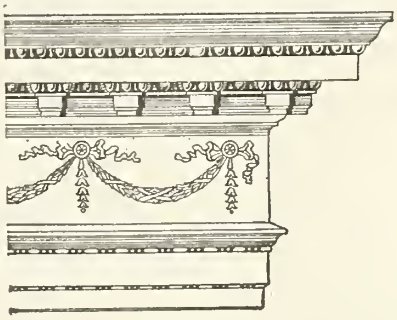
Galvanized Cornices



Our catalogue of galvanized cornices will aid you to decide on a suitable style of cornice for any job.

Gladly sent, together with price list, to any architect or builder. Special cornices made to any detail.

The Metallic Roofing Co. LIMITED

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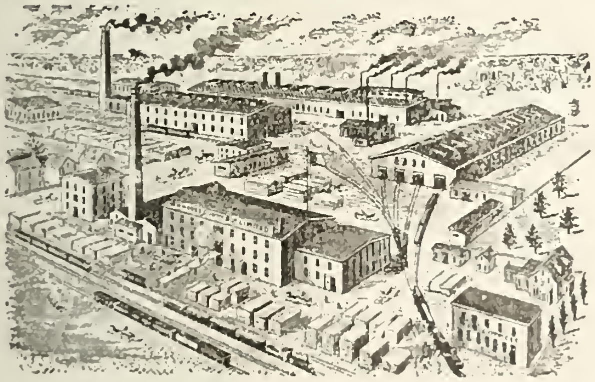

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SCHOOL DESKS A SPECIALTY

We manufacture all kinds of building materials, including cast iron columns, cresting, sash weights, etc.

In addition to our large stock of native lumber, we are now carrying about one million feet of foreign lumber, including oak, walnut, ebony, whitewood, basswood, red cedar, Douglas fir, mahogany, &c.

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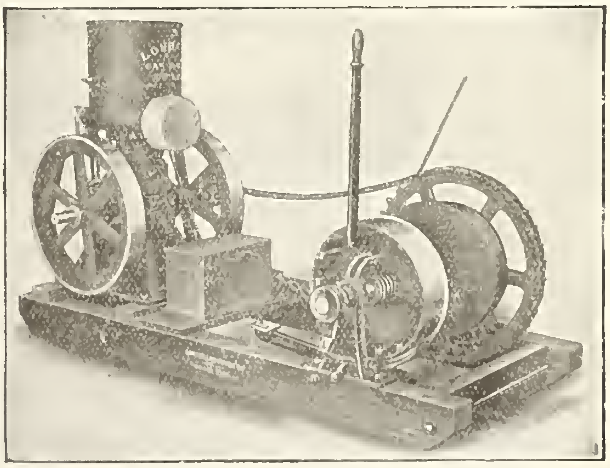
Do You Want a Good Hoist?



PATENT APPLIED FOR

"London" Friction Clutch Hoist

Here are a few of its many uses

Contractor's Work	Mortar Conveying	Well Digging
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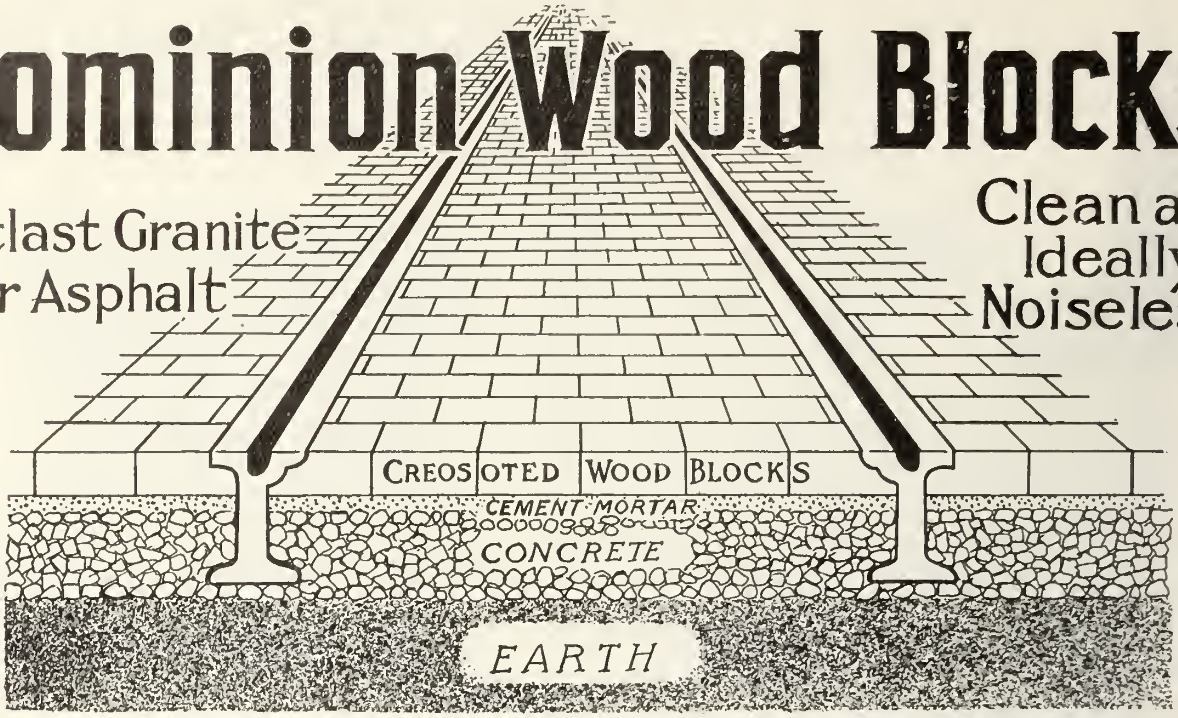
This hoist can be used with any make or style of gas, gasoline or oil engine

The London Gas Power Co., Limited

Engineers and Machinists London, Canada



Dominion Wood Blocks

Outlast Granite or Asphalt

Clean and Ideally Noiseless

The Proof of the Pudding

May be in the eating; which seems also to suggest ease of early dissolution. The exact reverse applies to the PROOF OF A

Permanent Pavement

One that requires the constant attention of the Repair Gang to prevent its break-up and ruin could not be said to have proven satisfactory. Yet the Repair Gang seems to be an essential feature of Patent Pavements. ¶ How often have you seen the **Creosoted Wood Blocks, The Wood Eternal,** being PROVED IN THE PUDDING MANNER? ¶ Dominion Creosoted Wood Paving Blocks are cut from the log of live Douglas Fir in our own mills.

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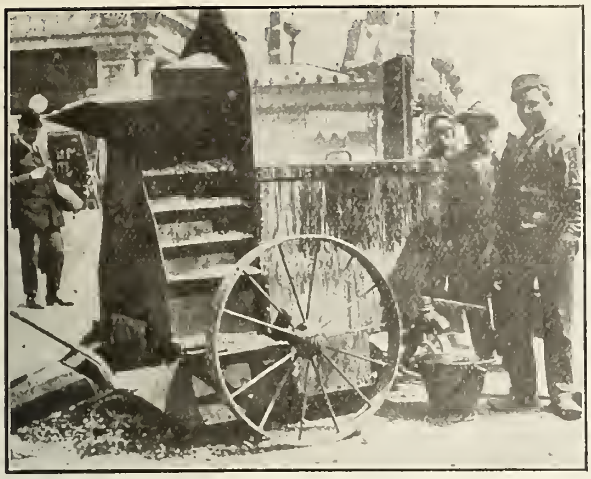

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A Money Maker for Contractors

Is on wheels and can be easily moved about. Supplies hot gravel and hot tar from the one fire.

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The Waterous DOUBLE CYLINDER Road Roller

Waterous Double Cylinder Rollers can be used on any kind of road work. Over 130 have been sold in Canada. They have made good wherever used.

The Waterous Roller is built in 10, 12 and 15 ton sizes which can be supplied from stock.

Its special features in which it differs from other rollers on the Canadian market are:—Double Cylinder, Double Crank Engine, high pressure, locomotive type boiler; rocking grates; dumping ashpan; two speed forward and reverse motion with all gears cut from solid steel.

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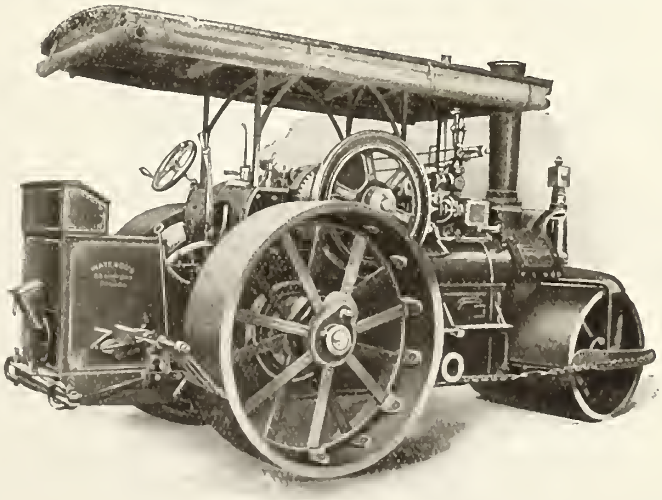
Fully described in bulletin No. 301.



When you see a Waterous Roller at work, ask the man in charge what he thinks of the machine.

The Waterous Engine Works Co., Limited
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Note tremendous metal weight on this floor. Entire building of Alsen's Cement reinforced concrete

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

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Put on a wall two sheets of lath, one the ordinary kind and one of Herringbone. Mix your plaster too wet and without sufficient hair. By varying your mix you will easily find a plaster which will drop badly from the back of the ordinary lath but will not drop from the Herringbone.

Herringbone Lath gives the best key

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The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.

Many special features. Write for full particulars.

Also Asphalt Mixers
East Iron & Machine Company, Lima, O., U. S. A.

EVERYTHING YOU WANT

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Water, drains, sidewalks, gas, electric power, tramways, three railways, police and fire protection and all Montreal's facilities

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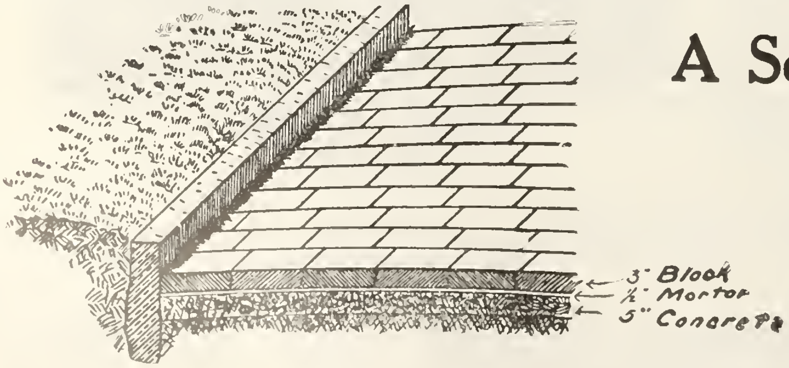

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Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
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These requirements are met by
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**Used by the Largest Mining Companies and Hydro-Electric Plants.
Also Extensively for Dredging, Exhaust Steam, Compressed Air, etc.**

Sizes 3 to 42" Diameter up to ¼" in thickness
Easily installed and securely connected with our Forged Steel Flanges or All Steel Bolted Joints.

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Crushed Stone

All sizes. For Roadways and Sidewalks also specially adapted for

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Our arrangement with C.P.R. to have our stone brought to Toronto DAILY by SPECIAL TRAIN makes our DELIVERIES promptest possible.

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BRICK AND CEMENT COATING

The coating prevents discoloration or cracking from moisture and does not destroy the pleasing texture of the concrete or stucco. It has been endorsed by the National Board of Fire Underwriters as a fire retarder and is a perfect protection as well as a beautiful tint for the exteriors or interiors of residences, hotels, garages, factories and mills.

ON FLOORS it stands wear and washing and does not disintegrate. Let us send you a book which tells all about it and a list of the well known homes, hotels, mills and factories on which it has been used. Address, mentioning this medium.

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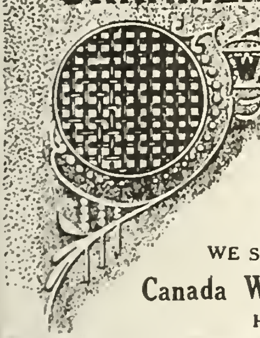
ORNAMENTAL IRON WORK WIRE CLOTH AND WIRE GOODS



We specialize in all kinds of screens for filtration and water works systems.

WE SOLICIT YOUR ENQUIRIES

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The Des Moines Hemispherical Bottom Steel Tanks and Towers

have been used and approved by nearly all leading Engineers. They are undoubtedly the most economical means of storing water at an elevation.
We have built many of these in Canada the United States and Mexico.
Estimates cheerfully furnished.

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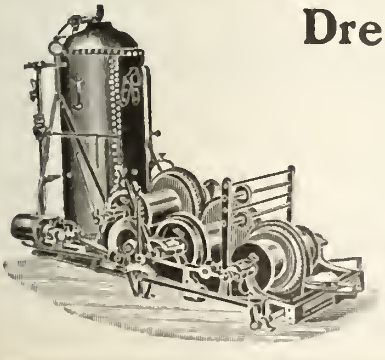
M. Beatty & Sons, Limited Welland, Ontario, Canada



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Steam Shovels
Steel Dump and Deck Scows
Submarine Rock Drilling Machinery
Mine Hoists, Hoisting Engines
Centrifugal Pumps, Clam Buckets
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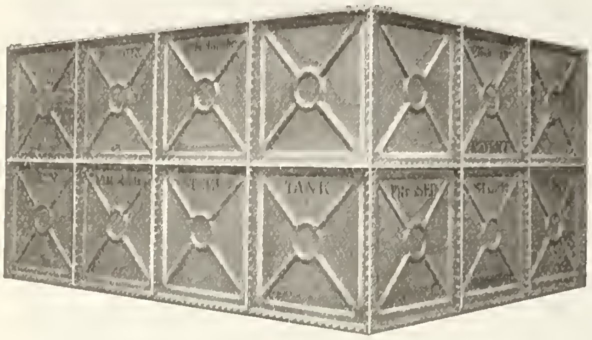
and other Contractors' Machinery



Capacity, 9600 Galls. **Size, 16 x 12 x 8 ft. deep.**

Patent Pressed Steel Tanks

are built up of plates 4 ft. square by 5/16th in. thick. There are only three types of plates and all are interchangeable. Easily erected by unskilled labor.

LIGHT. STRONG. CHEAP. UNBREAKABLE.

IMMEDIATE DELIVERY FROM STOCK.

STEEL PIPES—Welded or Rivetted

of any diameter over 12 inches and having any desired type of joint.

Thomas Piggott & Co., Ltd.

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Cable Address "ATLAS, BIRMINGHAM"

John Whitehead & Co.

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Albert Works: PRESTON, ENGLAND

Makers of

Reliable

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Tile and Pipe Machinery, and

CLAY WORKING PLANT

for all classes of Clays and Shales.

INQUIRIES SOLICITED. CATALOGUES POST FREE.

Established over 75 years. TELEGRAMS: Brictile, Preston

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Galvanized Wire Wound and Continuous Stave Wooden Pipe

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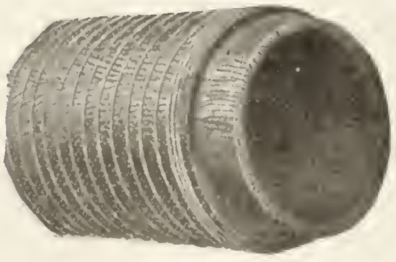

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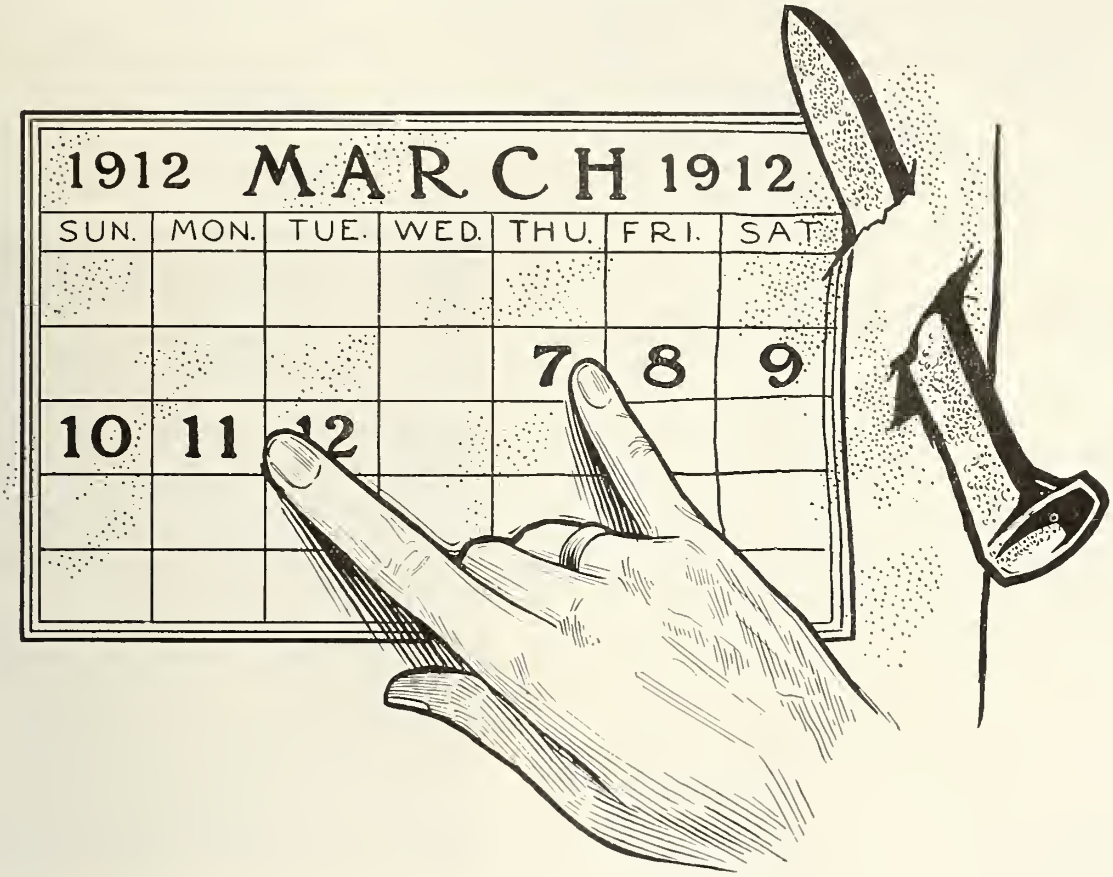

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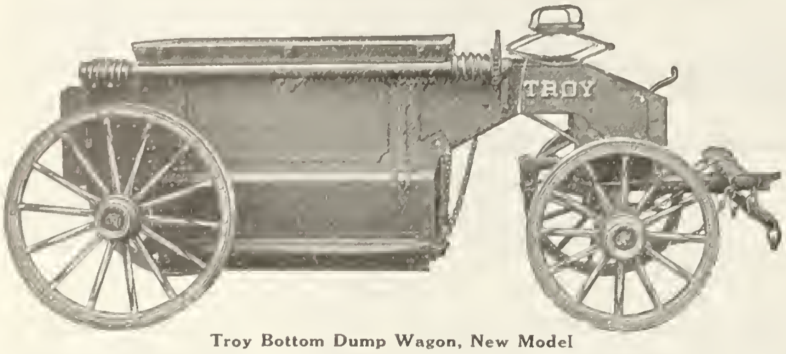

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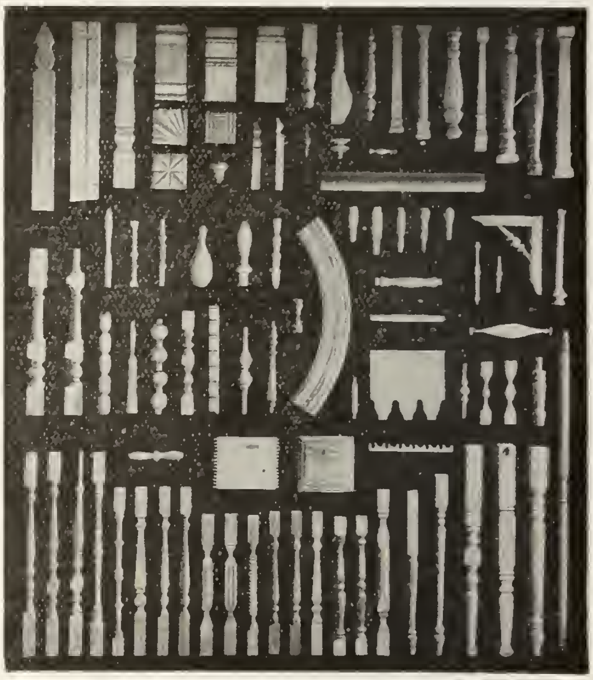

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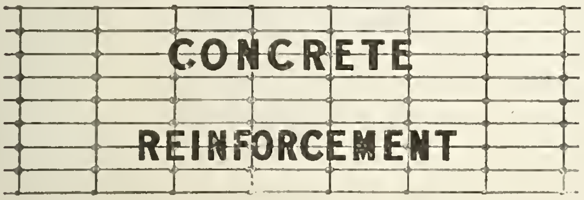
1 sq. in. sectional area has 27.75 lineal inches for bonding against 3.5343 and 4.0 ins. for round and square steel bar. Maximum tensional stress in concrete, 25,000 lbs. as against 16,000 lbs for steel bar.



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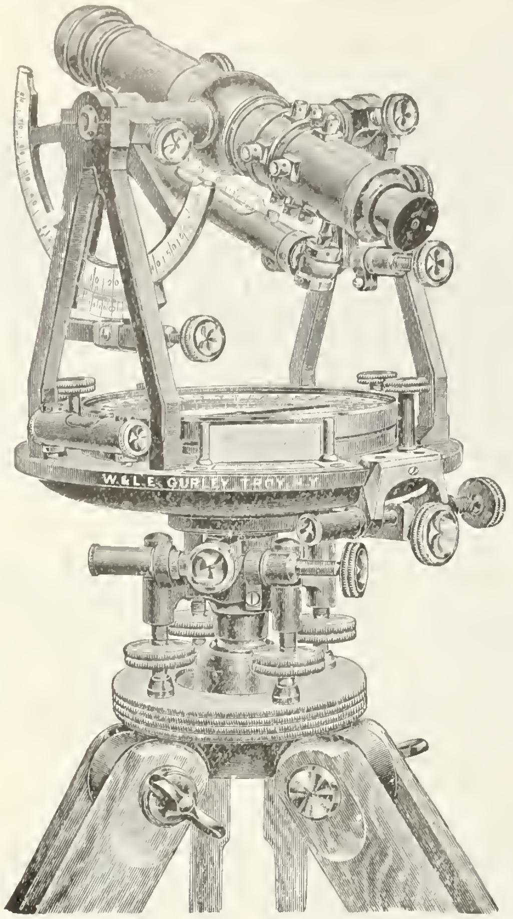
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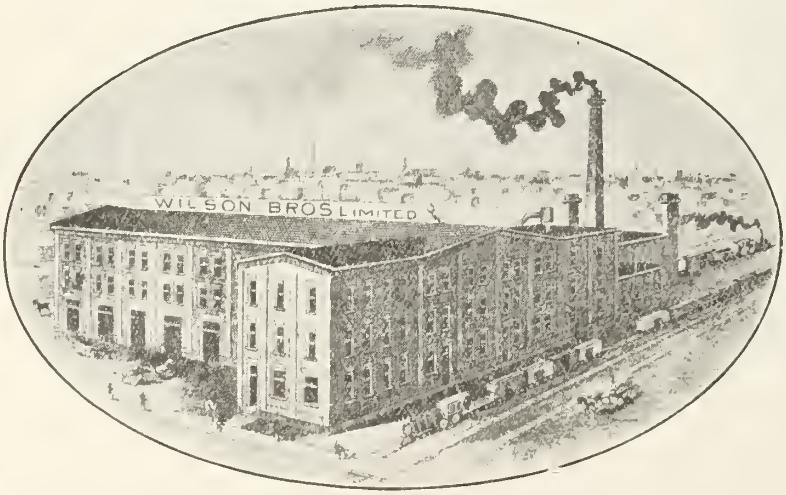

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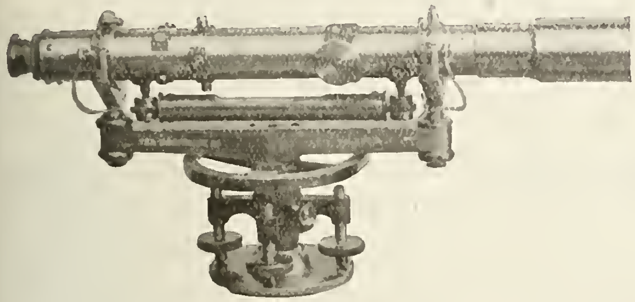

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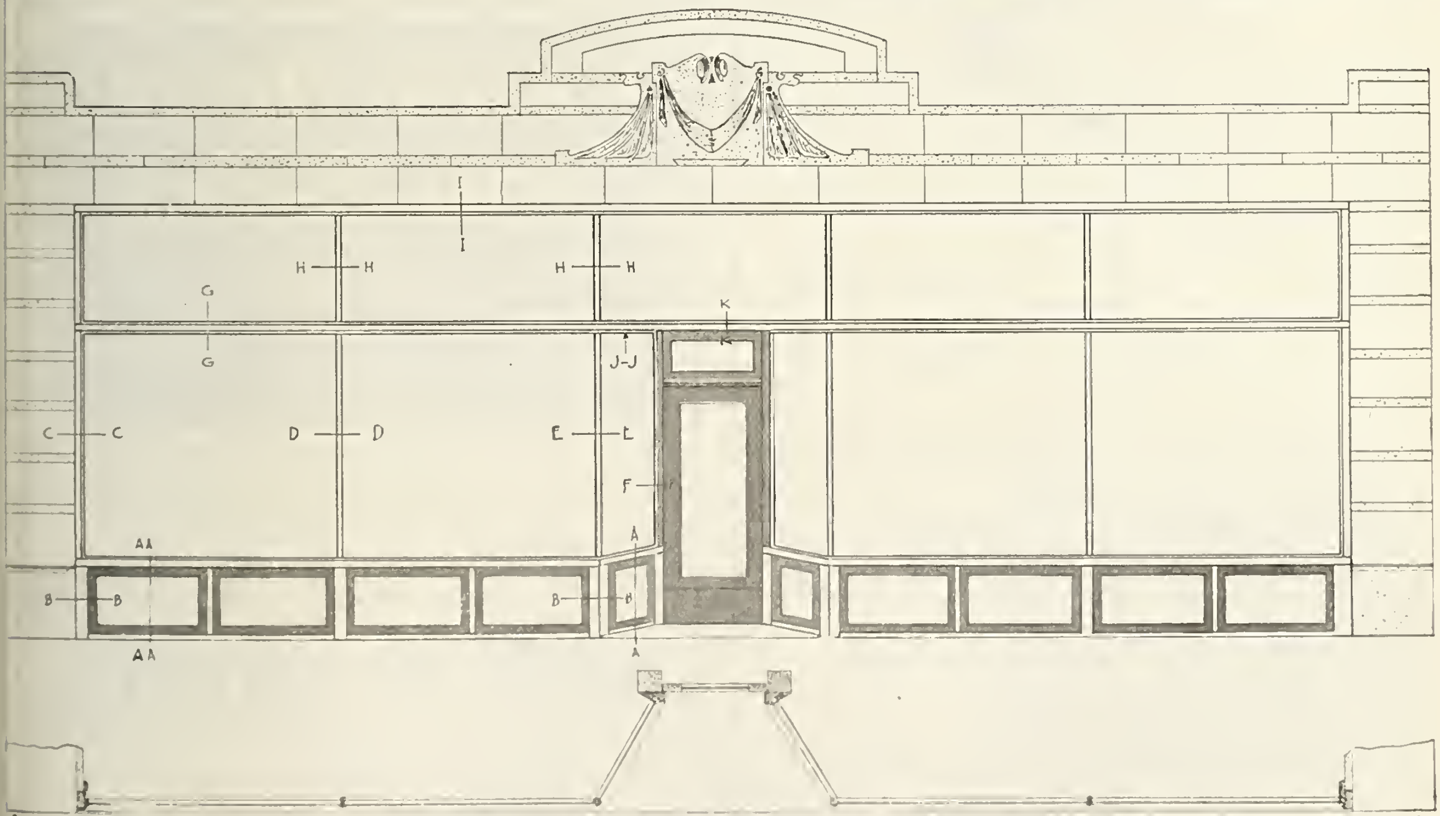

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The following are wholesale prices delivered at Toronto:—

	Per M
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.50	$ 6.75	$ 5.25
40 u. i.	4.25	3.75	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50 foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts—Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 per cent.

No. 4 compression bath cock	net $1.75
No. 4½ Fuller's	net $2.35

Square head brass cocks, 65; iron, 65 per cent.

Boilers—Galvanized Iron Range

30 gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)	Black.		Galvanized
¼ inch	1.80	¼ inch	2.57
⅜ "	1.80	⅜ "	2.57
½ "	2.35	½ "	3.23
¾ "	2.75	¾ "	3.83
1 "	3.93	1 "	5.48
1¼ "	5.35	1¼ "	7.49
1½ "	6.44	1½ "	8.98
2 "	8.05	2 "	11.46
2½ "	12.85	2½ "	18.30
3 "	16.86	3 "	24.03
3½ "	22.57	3½ "	33.65
4 "	25.65	4 "	35.90

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-nch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

Crushed stone, 2-inch, $1.30; 1-inch, $1.30; ⅜-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and leads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $3.00.

Manilla Rope, best, per pound, 16½ cents.

PAINTS AND OILS

(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $6.75 to $7.00 per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, 99c. per gallon of 9 lbs.

Raw Linseed Oil, in barrels, 96c. per gallon of 9 lbs.

Turpentine, in barrels, 73c. per gallon.

Pure Red Lead, dry, $5.50 to $6.50 per 100 lbs.

Business Notes

Hamilton, Ont.

Printing and stationery plant, destroyed by fire. Owner of plant, Robert Duncan Co., president, R. A. Robertson, York and James streets. Owner of building, Mrs. McGiverin. Loss on building, $40,000; on plant, $60,000. Company will re-build without delay. Presses, printing and bindery equipment will be required.

Iberville, Que.

On the 6th inst fire destroyed the Roman Catholic Church here. Loss $250,000, partly insured.

Pinkerton, Ont.

The sawmill of Campbell & Pinkerton burned. A new and larger mill will be erected requiring complete new equipment.

Windsor, Ont.

On the 6th inst. fire destroyed St. Alphonsus Separate School. Loss estimated at $25,000. Park and Pelissier sts.

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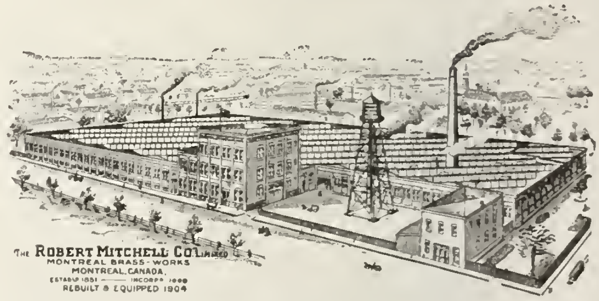

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NO CLAIMS IN DISPUTE

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We are specialists in the design and manufacture of valves and hydrants for waterworks systems.

"KERR" are known from coast to coast for the reliable service they always give.

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VALVE AND HYDRANT MANUFACTURERS
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A little booklet explaining many interesting features concerning the origination and perfecting of "steel interiors." It is agreed by authorities and proven by many actual and severe tests that no matter what precautions you take to fireproof a building, the structure is not nor cannot be "fireproof in reality" if inflammable trim is used, which permits the fire to spread from room to room and floor to floor.

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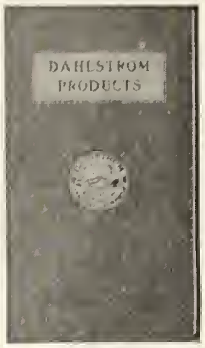

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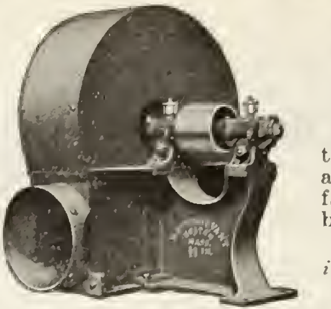
Executive Offices and Factories: 48 Blackstone Ave., JAMESTOWN, NEW YORK.
Branch Offices in All Principal Cities.



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Spare parts always ready for immediate shipment.

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Polson Iron Works Ltd., Toronto Eadie-Douglas Ltd., Montreal

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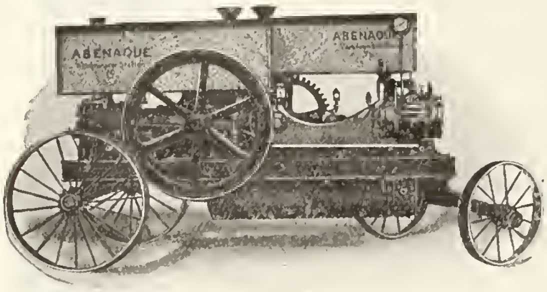

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Portable Compressor Outfit

costs but $12.00 per day to operate and saves the labor of 30 men. It is a money saver for every contractor using it. Let us show you where you can save money on your contract. **Write for Catalogue "M".**

Abenaque Machine Works

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Detroit River Tunnel Equipment Air Plant

Consisting of Compressors, Hydraulic Pumps, Cylinder Jacks, Hydraulic Pipe, Man Air Locks, Valves and Fittings of every description.

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A few dollars spent in advertising your proposals in

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would result in additional competition, which might save your city or town or your client many hundreds of dollars.

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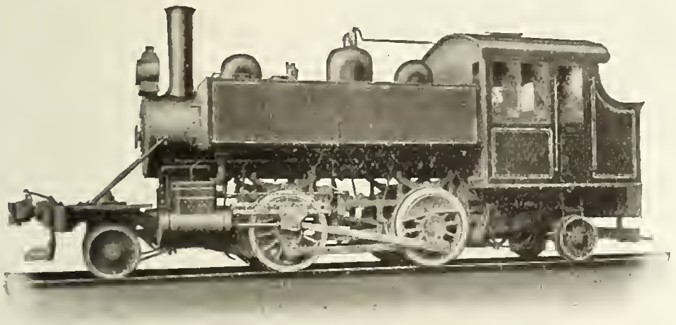

It is important for you to know what a locomotive will do to justify its cost.

It must pull the required load, start it and keep it going.

It must provide just the right amount of the right material in the right place.

Each and every part must be sure to fit not only the locomotive of which it is a part, but every other locomotive of the same size and design. Every operation must be made in fixtures or to templets compelling accuracy of manufacture so that the machine will not be idle at a critical time for necessary repairs or renewals. Spare parts must be instantly available, made so well as to go into place without a machine shop.

Visit our works and see how all this is accomplished.

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BANK OF OTTAWA BUILDING, MONTREAL, CANADA

Cumberland County Quarries
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Hardens with Age. Low Price. Samples and Quotations Free

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STONE of any Size and in any Quantity on hand for Sidewalks, Roadwork or Concrete Work

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G. W. ESSERY, Manager

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Suitable for Sprinkler Systems Fire Protection, Water Supply Plants, etc.

Steel Substructures of all kinds
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Ontario Wind Engine & Pump Co.
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For Sale for Immediate Delivery

1—Buckeye Trench Machine, cuts trench 15 in. x 5½ ft.
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1—Parson Trench Machine, cuts trench 24 in. to 60 in. x 20 ft.
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1—26 ton Little Giant Traction Shovel.
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1—No. 5 Austin Crusher with Corrugated Head and Back Gear.
1—No. 5 Gates Crusher Style "K" with smooth head in excellent condition.
1—No. 5 McCully with new head and new shaft.
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Get our estimates on this work. We are prepared to turn out work promptly and reasonably.

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VULCAN IRON WORKS CHICAGO ILL., U.S.A.
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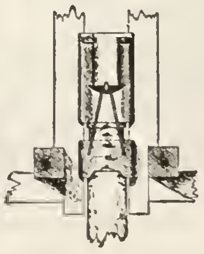
Steam Hammer



Casgrain Pile Cap

Perfect Head Block

This old man can do as much work in eight hours with one 56 lb. Class "B" McKIERNAN-TERRY Hammer Drill as ten husky high class miners can do, drilling by hand.

He can do as much work in eight hours as two high priced drill runners and two "chuckers" can do with 2-3 1/8" Standard Reciprocating Rock Drills and the CLASS "B" ONLY USES 65 cu. ft. OF AIR PER MINUTE AGAINST 135 cu. ft. per minute for each of the 3 1/8" old style drills.

This little Class "B" will "down" holes, either wet or dry, from 6 to 8 ft. deep.

THE VERY THING FOR SHAFT SINKING

Its PRICE is LOW. Its EFFICIENCY HIGH. We carry them in stock.

Canada Foundry Company, Limited

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District Offices :

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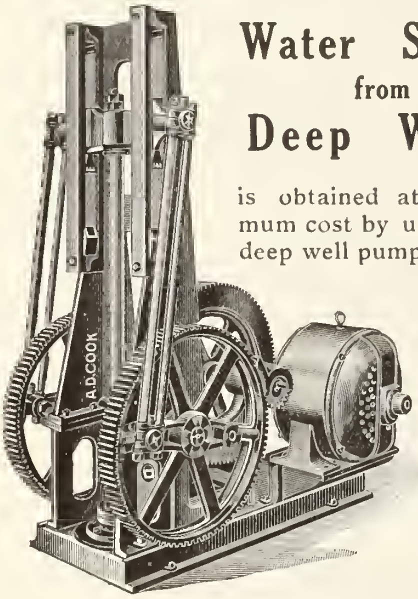
"Bull Frog" Wheelbarrows and Concrete Carts

OF ALL DESCRIPTIONS

Are you satisfied with your wheelbarrows, if not you can purchase the "Bull Frog" brand from Dominion Equipment Co. of Winnipeg, and A. J. Brown-Jamison Co., of Vancouver, and be assured of satisfaction.

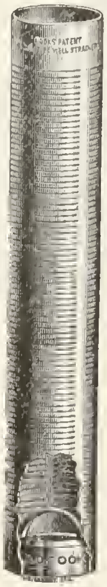
THE TOLEDO WHEELBARROW COMPANY, TOLEDO, O., U.S.A.



Water Supply from Deep Wells

is obtained at a minimum cost by use of our deep well pumps.

Write for Bulletin 26 explaining the use of Cook's Patent Brass Tube Well Strainer



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Lawrenceburg, Indiana, U. S. A.

Manufacturer of a Complete line of **DEEP WELL SUPPLIES** including Steam, Belt and Motor Driven **DEEP WELL PUMPS**, Wind-mill and Hand Pumps, Working Barrels and Valves, Pump Rods and Pump Rod Joints, Drill Rods and Drill Rod Joints, Drilling and Well Tools.

Catalogue Mailed Upon Request.

The Consolidated Stone Company

Quarries and Mills at Bedford, Indiana, and Bloomington, Indiana

Producers of Dark Hollow Buff and Blue
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Celebrated

Bedford Stone

from our quarries has been used in many of the largest public buildings, churches, etc., in the United States and Canada.

Mill blocks, sawed, planed and turned stone of every description furnished on short notice. Write for information.

General Offices
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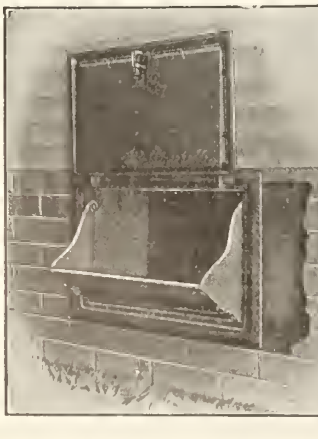

EQUIP YOUR CELLAR

with one of our "Majestic" Coal Chutes which is the neatest and best equipment for any cellar. It is easily installed in either new or old houses. It permits coal, wood or vegetables to be put into the cellar without disfiguring the building in any way. And unlike a glass window it cannot be broken. The hopper can easily be removed if desired to put in very coarse coal or wood, or if a waggon chute is used. It swings back into the chute and allows the door to be closed. The door is made to lock when opened upward, and protects the wall or siding above the chute, and can be released only when closed. We make three standard sizes. There's a size that's just right for your cellar and your requirements. No. 1—22 x 16 x 13 No. 2—27 x 16 x 13 No. 3—33 x 22 x 18

Send for our illustrated booklet, it shows and describes our full line of Coal Chutes

The Down Draft Furnace Co., Limited

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Montreal Representative: E. F. Dartnell, No. 8 Beaver Hall Square.
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THE LARGEST MANUFACTURERS AND
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Contractors', Surveyors'
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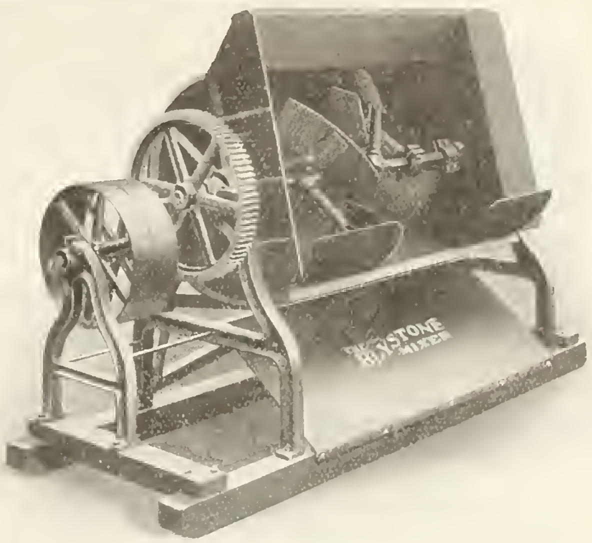
Lumbermen's Supplies

Tents, Covers, Straw Ticks, Sleeping Bags, Grey Blankets, Oil Clothing, Nose Bags, Coal Bags, Snow Shoes, Toboggans, Moccasins, Flags, Awnings, Sails, Canoes, Row Boats, Paddles, Oars and every description of Camp Supplies. Sole manufacturers of the Walsh Window Tent for Consumptives. Send us your orders.

Prompt Shipments Guaranteed.



The Blystone Skid Mixer

is designed to give the highest efficiency at smallest expense. Its construction is strong and its simple design renders it easy to work and easy to clean.

Specially adapted to brick, block and tile plants. Equipped with speed reducing gear, tight and loose pulleys, and can be belted direct to power.

The above cut shows the Batch Mixer on skids for shop use—in position for discharging material.

Catalogues sent on application.

The Blystone Machinery Company
52 RAILROAD STREET
Cambridge Springs, Pa., U. S. A.

TRADE MARK
"Bestoslate"
ASBESTOS
SHINGLES

Here Is A Roofing That Will Never Decay

You cannot make cedar, cypress or redwood shingles water proof—weather proof—decay proof—they are short lived under the best of treatment and repair expense comes often.

Specify and use "Bestoslate" shingles—a roofing that is not only decay proof but fire proof—make your clients' first cost the last cost.

Ask for our catalogue and booklets on asbestos—learn how the shingles are made that last a life time without paint or repairs—clip the coupon and mail it **now.**

The Asbestos Mfg. Co., Ltd.
E. T. Bank Bldg., Montreal

Please send me your catalogue and booklets on Asbestos Shingles.

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Address________________
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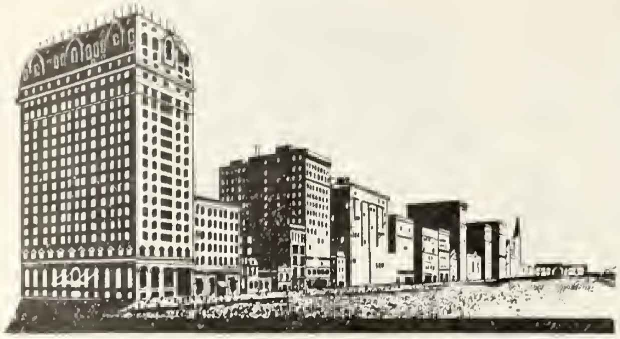
C. R.

THE ASBESTOS MFG. CO., LTD.
Eastern Townships Bank Bldg., Montreal
Factory at Lachine, P. Q.



Building Record

West ahead of the East by a big margin in 1911—Toronto has safe hold on premier position.

BUILDING PERMITS FOR YEAR

	1911	1910
Toronto, Ont.	$24,374,539	$21,127,783
Montreal, Que.	14.561,481	15,815,859
Winnipeg, Man..	17,550,000	15,106,480
Vancouver, B. C.	17,652,642	13,150,365
Ottawa, Ont.	2,997,610	3,022,350
Hamilton, Ont..	4,255,730	2,604,605
London, Ont.	1,036,880	805,074
Halifax, N. S.	508,796	630,380
Calgary, Alta.	12,909,478	5,589,594
St. John, N. B.	572,700	526,435
Victoria, B. C.	4,026,315	2,273,045
Regina, Sask.	5,099,340	2,351,238
Edmonton, Alta.	3,671,850	2,159,106
Kingston, Ont.	314,569	220,092
Maisonneuve, Que. ...	2,260,160	1,955,100
Peterboro, Ont.	345,372	517,958
Windsor, Ont.	739,575	392,040
Sydney, N. S.	495,642	347,554
Fort William, Ont. ...	3,078,010	2,381,125
Berlin, Ont.	358,095	347,550
Westmount, Que.	1,489,082	2,152,020
St. Thomas, Ont.	285,515	286,100
Brandon, Man.	1,043,929	982,385
Moose Jaw, Sask.	2,475,736	1,071,090
New Westminster, B.C.	1,058,400	
Saskatoon, Sask.	5,004,326	2,817,771
Port Arthur, Ont. .. .	597,705	892,681
Chatham, Ont.	233,000	....
Galt, Ont.	282,334	....
Belleville, Ont.	320,000	....
Woodstock, Ont.	143,200	82,000
Nanaimo, B. C.	152,611	....
Lethbridge, Alta.	1,033,380	2,211,310
North Vancouver, B.C.	772,468	....
St. Boniface, Man. .. .	1,140,735	861,870
Oshawa, Ont.	120,000	179,500
Strathcona, Alta.	491,403	363,470
Medicine Hat, Alta. ..	743,532	205,640
Welland, Ont.	342,808	245,942
Nelson, B. C.	166,700	163,430
	$131,886,775	$102,819,242

These figures show a gain of 28.2 per cent. over 1910. They give some idea of what we may expect this year. If you manufacture or sell anything that enters into the construction of buildings you should write to MacLean Daily Reports Limited, 220 King Street West, Toronto, and learn how they can help you help yourself. Their organization thoroughly covers the Dominion, and supplies news economically and efficiently, or present and prospective markets for the goods their subscribers sell. If requested they will gladly send specimen reports and rates and outline facilities for serving you.

Cloisonne
GLASS

For Windows, Transoms, Door Panels, Ceiling Lights, Window Blinds, Screens and Partitions, etc., — wherever artistic application of Glass is wanted—Give us an opportunity to show what Cloisonne Glass will do.

Cloisonne Glass Co. of Canada
Office and Factory, 62 Foundry Street South
Berlin - - - - Ontario

Take the Best Care of Your Horses, it will Pay You

Johnson's Reliable Veterinary Remedies

will give you better satisfaction for less money than any other preparations on the market. They are being used by most of the large horse owners throughout Canada—particularly by the Lumbermen and Railway Contractors.

The lines that are selling best are:

Johnson's Horse Liniment, No. 1 (Alcoholic)

1 gal. jugs (Imperial)	$4.50 gal
1 lb. bottles	8.00 doz.
2 lb. bottles	15.00

Positively the best all round Horse Liniment made.

Johnson's Horse Liniment, No. 2 (an oil liniment)

1 gal. jugs (Imperial)	3.00 gal.
1 lb. bottles	6.00 doz.
2 lb. bottles	11.00 doz.

Johnson's Horse Colic Remedy

A sure and speedy cure for all kinds of Colic

1 gal. jugs (Imperial) 40 doses	5.00 gal.
1 lb. bottles 4 doses	8.00 doz.
2 lb. bottles 8 doses	15.00 doz.

Johnson's Veterinary Healing Ointment (Gall Cure)

2 lb. tins	2.00 per tin
4 oz. tins	3.50 doz.

Johnson's Condition Powders (Concentrated)

1 lb. packages	3.60 doz.

A full supply of all drugs and patent medicines at lowest wholesale prices.

Have you ever used for your men

Johnson's Mosquito Oil 1.75 doz., 18.00 per gross
It positively does the trick

Our prices are lower than those of all other manufacturers. Letter orders receive prompt attention.

A. H. Johnson, Wholesale Druggist, **Collingwood, Ont.**

The Mushroom System

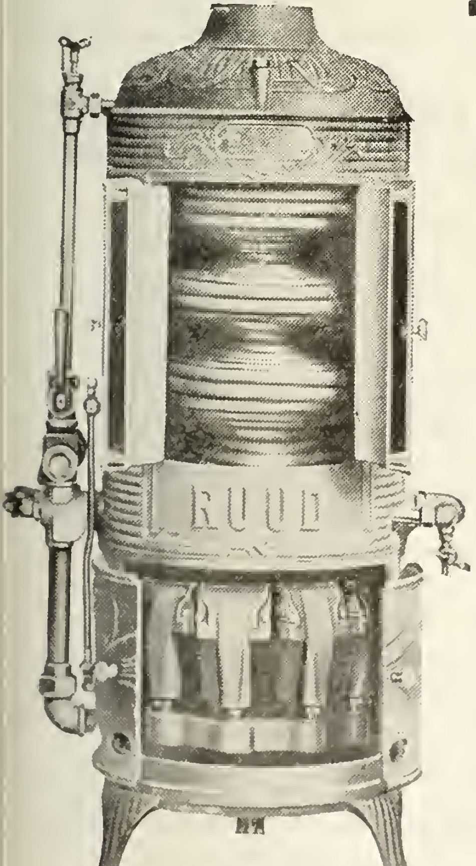
Of Reinforced Concrete is strong, economical and durable. Based on scientific principles, every pound of steel does the work it is designed to do.

The system is fully covered by broad patents in Canada, the United States, and all civilized foreign countries.

For lists of buildings, descriptive literature and estimates, address

C. A. P. Turner, M. Am. Soc. C. E.

816 Phœnix Building, Minneapolis, Minn.



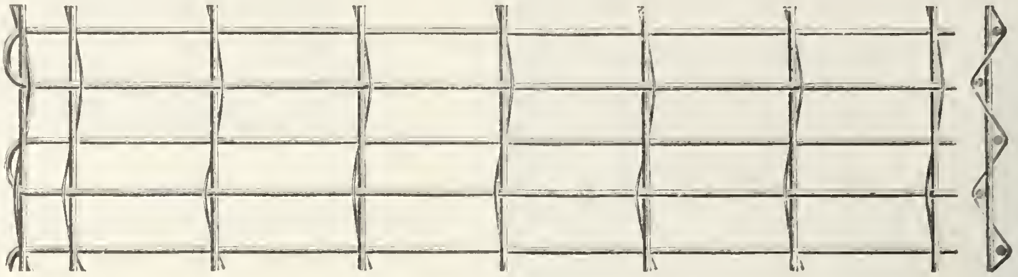
The RUUD
Showing Interior View

Thousands of Architects
Know the Value of
The "Ruud" Automatic
Instantaneous
Gas Water Heater

One installed in the cellar means hot water for everybody in the household at any time and all the time. Not only that, but all you have to do is just turn the hot water faucet. There is nothing to light or put out—no waiting for water to heat. Opening the faucet lights the gas in the RUUD and closing the faucet turns off the gas. The supply is inexhaustible, because the water is heated **as it flows.** There is a RUUD in operation at our salesroom. It will interest you if you come in and see it work. 12 and 14 Adelaide St. W., or send for representative. 700 now in use in Toronto.

The CONSUMERS' GAS COMPANY
19 Toronto Street, TORONTO
Telephone Main 1933 Main 707 Main 4142

Greening's Patent Trussed Wire Lath



Easily applied. The best, cheapest and most satisfactory on the market.

Write us for particulars and price.

Wire Rope, Wire Reinforcing

MANUFACTURED BY

The B. Greening Wire Co. Limited

HAMILTON, Ont. - MONTREAL, Que.

Flooded with Light by LUXFER PRISMS

The transom of this store is of Luxfer window Prisms.

The ceiling has a large area glazed with Luxfer Prisms and the canopy was designed and erected by us.

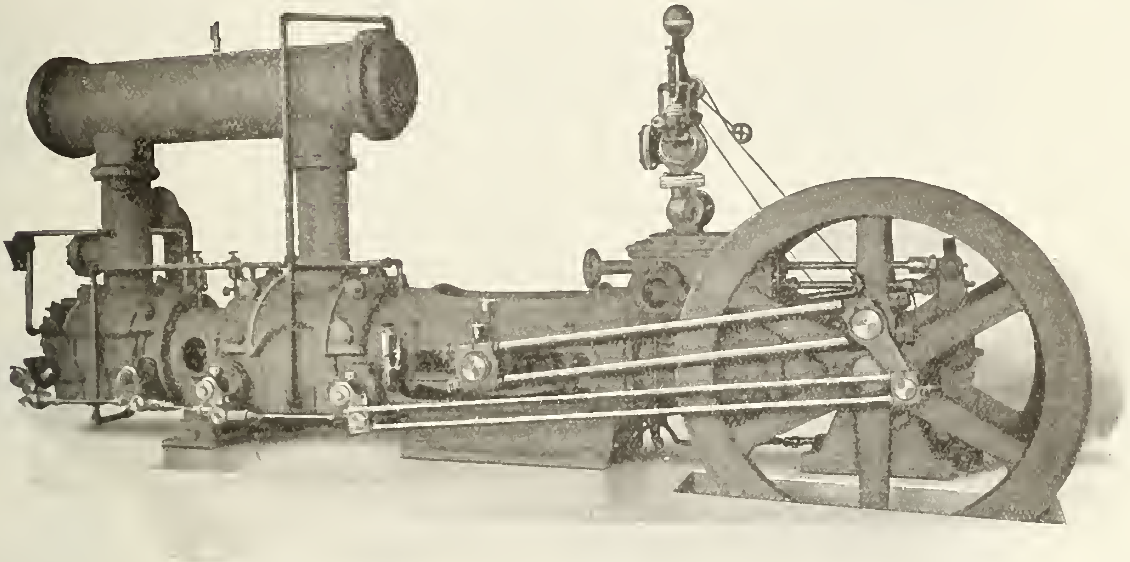
The result is one of the most attractive store-fronts in town and a brilliantly lighted interior.

Always Specify LUXFER PRISMS

Luxfer Prism Co.
Limited
100 King Street West, Toronto

COMPOUND AIR CYLINDERS SHOULD INTEREST

AIR COMPRESSOR PURCHASERS



"Rand" Compound Straight Line Air Compressor, Steam Driven
Capacity 744 cubic feet free air per minute

A two stage air compressor will save **15 %** of the power required to compress the same amount of air by a single stage machine

In designing this machine a great deal of attention has been given to stiffness. The design is fundamentally that of a cylinder well ribbed and reinforced. This shape has been adopted as the basis of construction because it is a well known fact that no form will as successfully stand all kinds of stresses as a cylinder which is properly reinforced.

Although the addition of an extra cylinder to this design has added a little weight, the machine is just as portable as was the original single stage compressor as this weight has been provided for in construction.

Through the simplicity of this type it lends itself just as readily to work of a temporary nature as to permanent duties and soon pays for itself in the saving of power which it effects.

Some of the most extensive air compressor buyers in the country have standardized on this type.

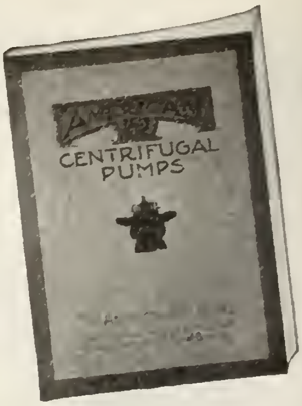
CANADIAN RAND COMPANY

LIMITED
COMMERCIAL UNION BUILDING
MONTREAL - CANADA

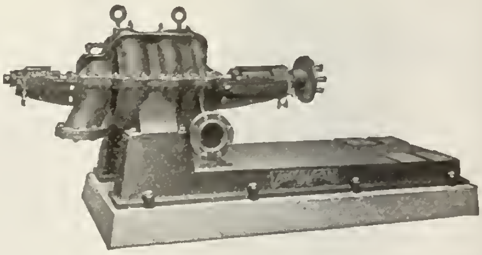
Toronto Cobalt South Porcupine Winnipeg Lethbridge
Rossland Vancouver Sydney

Why "American" Centrifugals

Are Most Economical in the Widest Range of Pumping Conditions.



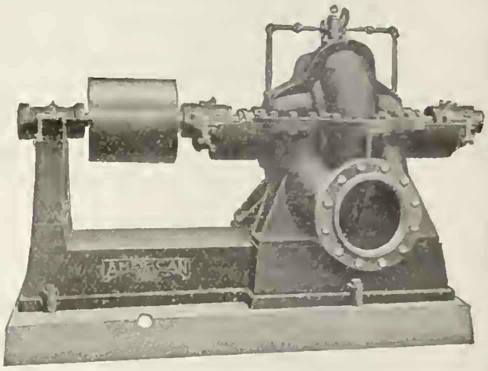
The reason why "American" Centrifugals are unequalled for economy is that they represent the highest development of the most modern type of pump and there are the best of reasons for this higher development.



Instead of building a single type of centrifugal and recommending it for every purpose "American" centrifugals are built in over fifty distinct types and every size of every type is carefully tested in our own complete hydraulical laboratory and its efficiency proved before it is permitted to leave our works.

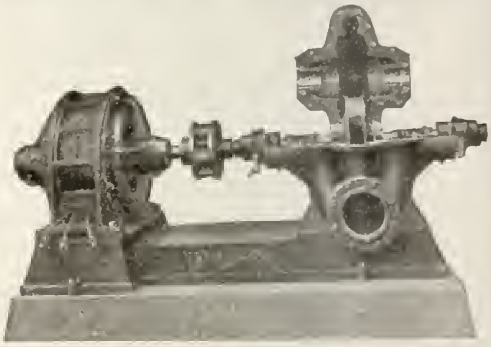
It must meet our standard of efficiency before it is allowed to leave our works and that is what is making the American trademark famous in pumping machinery.

AMERICAN



"American" centrifugals attain up to 80 per cent. mechanical efficiencies and many of our specially designed pumps, installed according to our own specifications, show much higher efficiencies, enabling them to operate against high heads. We have many single stage centrifugals installed operating on over 200 feet heads.

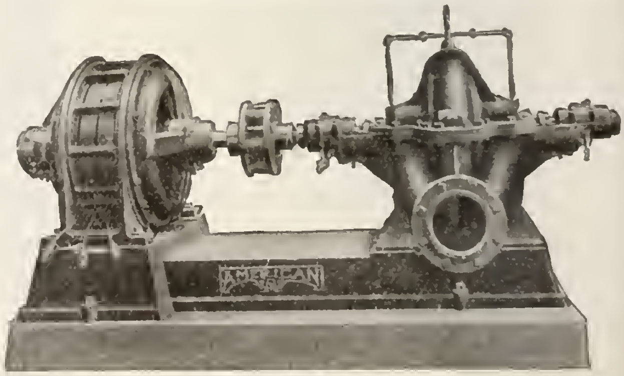
The low first cost of "American" centrifugals as compared with old style plunger pumps, combined with their high efficiencies, low cost for attendance and small cost for repairs make them **far more economical** than any other type of pump in nearly all conditions where **all costs are considered.**



Greatest economy in the end is the claim we make for "American" centrifugals and we are ready to prove that claim.

If you are interested in irrigation, write for our booklet, "Irrigation by Pumping" Bulletin No. 118.

Our General Centrifugal Pump Catalog No. 117 is the most complete ever issued. Write for it today.



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To the frequent question, "Will 'Prime White' road oil produce all the results of the black road oils?"

NO

1. It does not last as long as a good black oil (Asphaltoilene).
2. It is not a road binder.
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5. It will not track on the side walks or into houses.
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7. It will not stop traffic for a moment.
8. It will not require a top dressing.
9. It will not soil shoes, clothes or carpets.
10. It will not meet the requirements of engineers who are seeking the impossible or impractical.

IT WILL

1. Lay the dust on any road.
2. It will be clean, odorless and colorless.
3. It will leave no black dirty mess to be tracked into houses.
4. It will improve and preserve any road.
5. It can be applied any time of year.
6. It costs only a fraction of any black oil.

BUT

Don't take our word (or anybody's). See it for yourself.
Ask for sample of "Prime White". (It costs you nothing).
Also illustrated book, "Road Bitumens, Their Scientific Use and History."

"Prime White" Road Oil Co.

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RUBBER COVERED WIRES AND CABLES
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Solid, Stranded or Flexible Conductors

in Single or Multiple Rubber insulated with or without Lead Sheath.

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That do not warp, sag or crack

Midland Brand

Our Doors are made from select material and by expert workmen. Modern facilities and careful attention to details enable us to satisfy you in price and quality.

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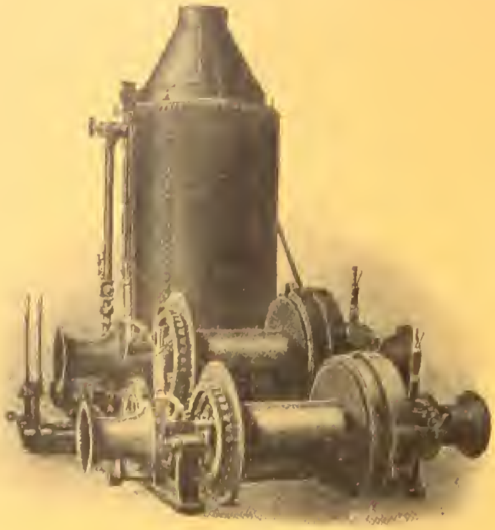

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We can furnish hoists designed to suit every purpose; our hoists give the maximum results with a minimum cost.

Steam - Belt Driven and Electric HOISTS

of all capacities for prompt shipment

Centrifugal Pumps

either with direct connected engine or belt driven

We carry all sizes of centrifugal pumps in stock ready for immediate shipment.

Derricks **Concrete Mixers** **Crushers**

F. H. Hopkins & Co.

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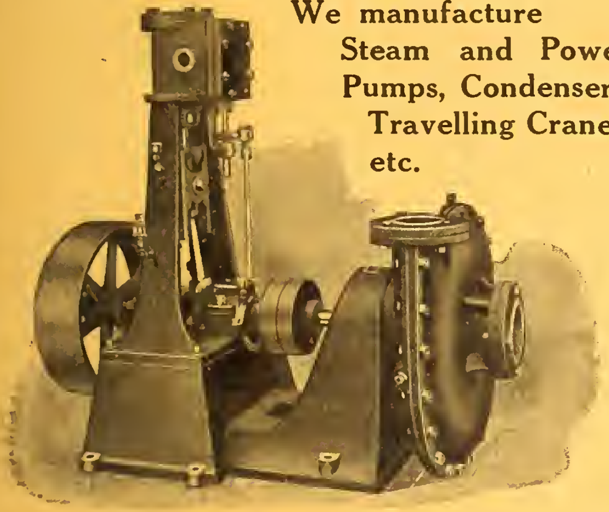
Contract Record and Engineering Review

ESTABLISHED 1886



We manufacture
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"MADE IN CANADA"

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Made in all Kinds of Glass on Short Notice

Large Bent Plate Glass for Shop Fronts a Specialty

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SERVICE

Continuous economical service is what RAND machinery means to purchasers

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Canadian RAND Co. Limited
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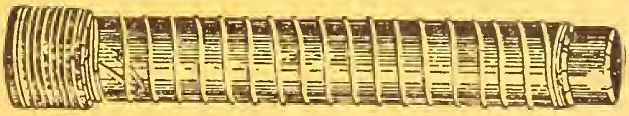

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WATER PIPE

RESERVOIR TANKS

for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

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Full Particulars and Estimates Furnished

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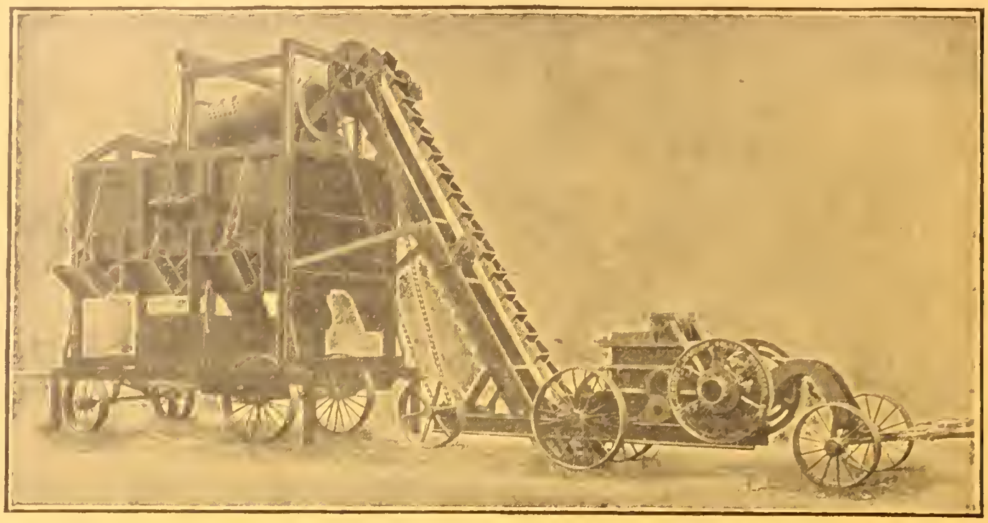

Capacity 150 tons in 10 hours.

Size of Crusher 9" x 16. Will crush to 1½".

Complete

Crushing Plants

including

Portable Boiler and Engine

This cut reproduced from a photograph will give one a good idea of a neat and compact plant.

We have been in the crusher business for years, and our past experience is at your disposal.

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General Offices: Sherbrooke, Que.

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"For the two 'AMERICAN' Engines which we have used for six years, we have paid very little for repairs. We have Engines of other makes on which the repair bills have been FOUR TIMES what we spent on the 'AMERICANS.'

We use these two engines for Pile Driving (the hardest work an engine is called upon to do), because we consider them better adapted to this kind of work than any other engine on the market.

The several 'AMERICAN' Derricks we have are the BEST WE HAVE EVER USED, and do not see how any one could make a mistake in buying 'AMERICAN' Derricks or Engines."

LANGHORN & ALLAN, Oneonta, Ky.

THERE IS UNMISTAKABLE ENTHUSIASM AND SINCERITY IN THIS LETTER FROM CONTRACTORS WHO RANK HIGH IN THEIR PROFESSION

May we send you prices and information on "American" Machinery?

AMERICAN HOIST AND DERRICK CO.

ST. PAUL, U. S. A.

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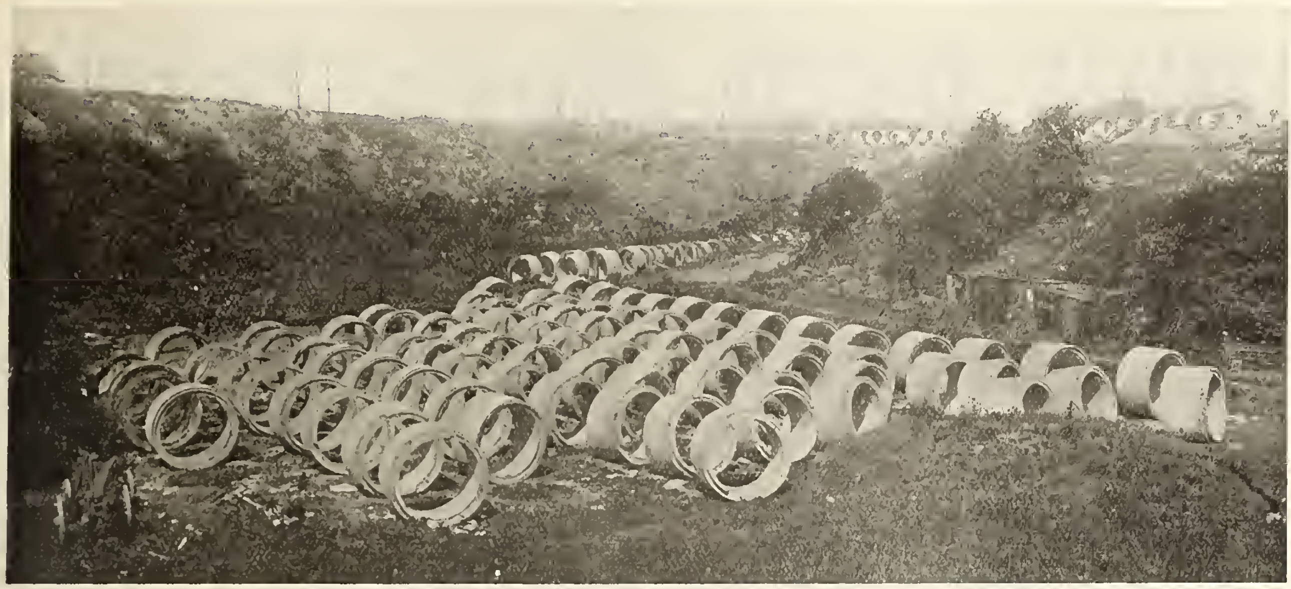

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There is no longer any question about the suitability of concrete for the making of sewer pipes, drains or any work that has to withstand the corrosive effects of acids or the damages inflicted by frost and water.

Reinforced concrete, **properly made,** has been successful in the most rigid tests and is now the recognized material for all important work.

Properly made concrete, means, not only thoroughly mixed and the right proportions of cement, aggregate and sand—it also means that the cement used, be of the highest standard of purity.

The pipes shown here were made in Hamilton, Ont., by the REINFORCED CONCRETE PIPE CO. of JACKSON, MICH. They have made pipes for some of the most important work done, both in the United States and Canada and they now use "Canada" Cement exclusively.

THE REINFORCED CONCRETE PIPE CO. report that although they have, on one piece of work, used cement from no less than five of our mills, they could see no difference in the quality of the cement or in the work produced. That is what the "Canada" Brand stands for:—absolute purity and absolute uniformity.

Canada Cement Co., Limited

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Will Drill More Footage

at a **Lower Cost** for maintenance and operation than any other make of equal size.

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Winner of 3 First Prizes in competition with the world

We carry Complete Drills in stock and can make other complete drills from stock of duplicate parts.

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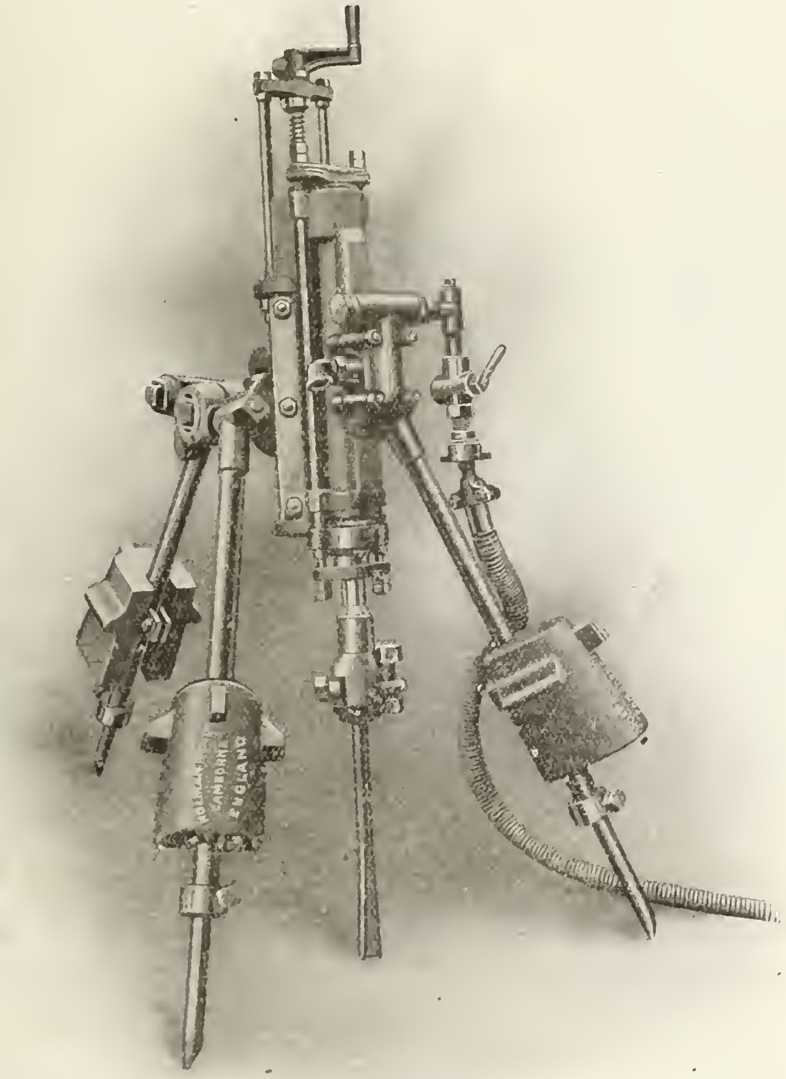
Cobalt, opp. Right of Way Mine.

MUSSENS

With the Holman Chuck you

Don't Need to Shank your Steel



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(Continued on page 12)

DON VALLEY BRICKS

Residence of Mr. J. C. Eaton, Toronto. **Messrs. Wickson & Gregg, Architects**

Don Valley Porous Terra Cotta Fire Proofing, Foundation Bricks, Facing Bricks and Enameled Bricks Exclusively Were Used in This Structure

¶ These bricks have been the unanimous choice of discriminating architects and owners in competition with samples submitted by the leading brick firms of Canada and the United States. They are the only thoroughly vitrified facing bricks ever manufactured in the Dominion, and the most exclusive high-class pressed brick on the American continent.

¶ The above view is an illustration of one of the many important buildings in which this product is used.

THE DON VALLEY BRICK WORKS

Head Office: 36 Toronto St., TORONTO
Montreal Agent: **David McGill, 83 Bleury Street**

Most mixing Least Fixing

That's the Whole Story in Four Words

CONCERNING

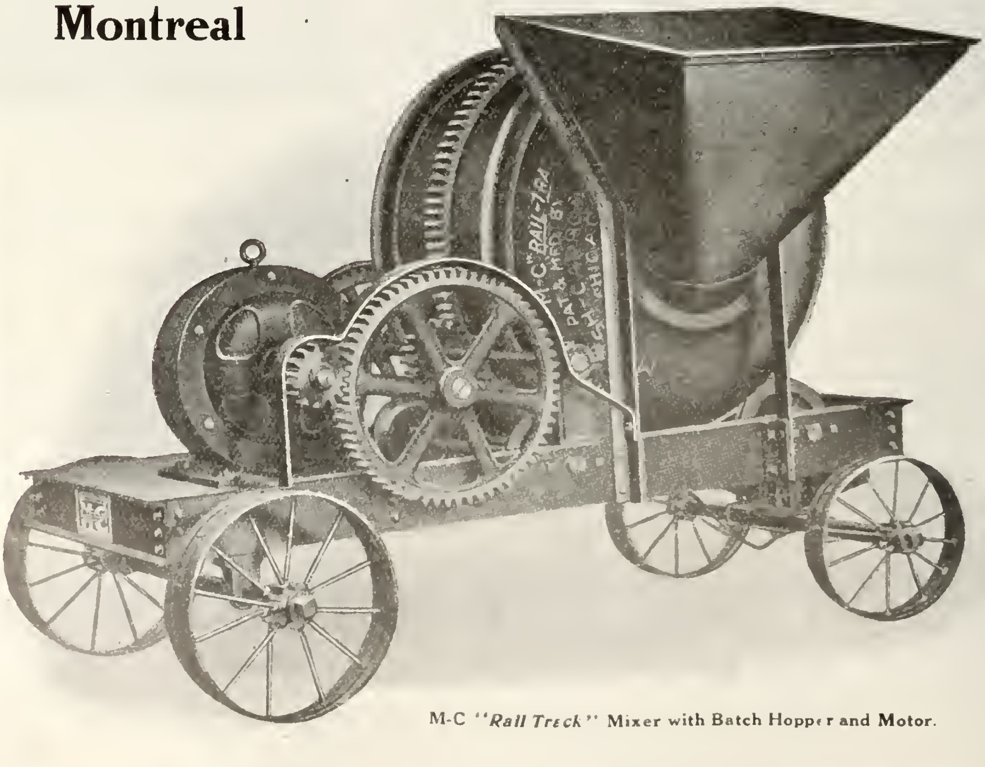
The M-C *"Rail Track"*

Concrete Mixers

The Catalogue will tell you why. Get it from

The Ford Iron Co., Limited

Montreal



M-C *"Rail Track"* Mixer with Batch Hopper and Motor.

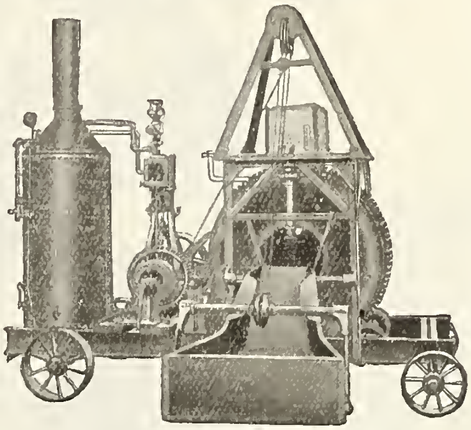
Have You Seen Our 1912 Catalogue of Concrete Machinery?

LONDON
London Concrete Machinery Co. Ltd.

London Automatic Batch Mixer No. 1

It's a dandy 160 pages illusrations.

Showing the Largest Line of Concrete Machinery ever crammed into a catalogue.



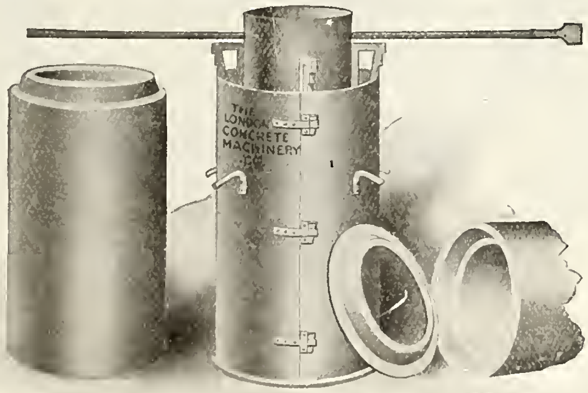
London Standard Drum Batch Mixer

All Made in our Own Factory and under a system producing an Excellence of Quality. Our large output Right from Factory to the Contractor.

Even at such remarkably low prices is preferable to exorbitant prices and small output

Some people wonder how me can sell high grade machinery at such low prices.

IT IS QUITE SIMPLE


THE LONDON CONCRETE MACHINERY CO.

London Sewer Pipe and Tile Moulds

We manufacture over twenty different sizes and styles of

Concrete Mixers
Mortar Mixers
Concrete Block Machines
Cement Brick Machines
Cement Tile Machines
Tile Moulds
Rock Crushers
Screen Sand Elevators

Our Enormous Sales and Small Profits is Sufficient Explanation.

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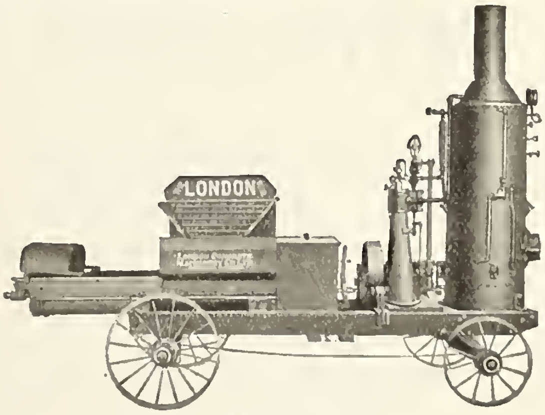
Pumping Outfits
Steam and Gasoline Hoists
Material Elevators
Sidewalk Forms
Sidewalk Tile Machines
Concrete Carts
Wheel Barrows
Sill Step and Window Cap Moulds
A complete line of Cement Working Tools

London Paving Mixer with Side Lift and Rear Discharge



London Automatic Batch Mixer No. 2

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

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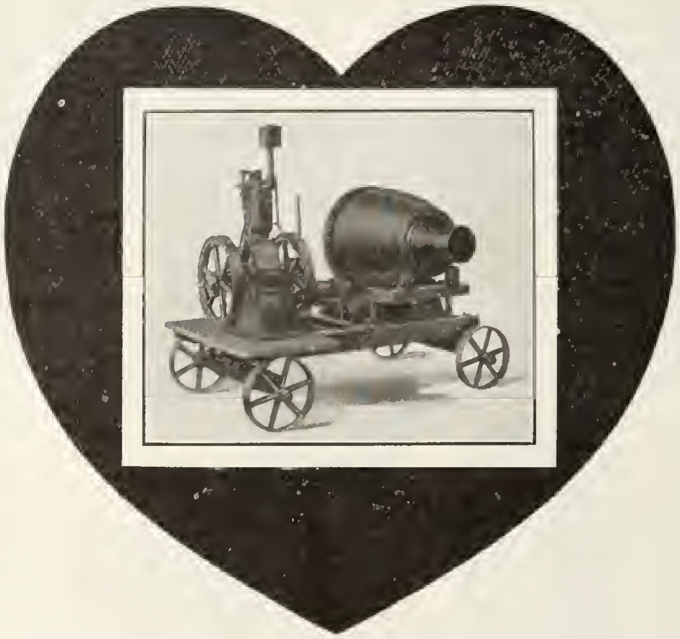
We are the Largest Manufacturers of Concrete Machinery in Canada

Wettlaufer Improved Heartshape Mixer



Don't
Hammer, Scrape, or Cut!

Save yourself all trouble by buying a

"WETTLAUFER HEARTSHAPE" MIXER

IT WILL GIVE YOU

A quick and perfect mixture.
A clean drum when you are through.
The best work with unlimited capacity.

All parts, including all bearings, gears, etc., of Wettlaufer Concrete Mixers are Semi-Steel Castings.

With our new oiling system all bearings are fed direct from the centre of the bearing. By this means all the grit is forced out of the end of the bearing thus reducing the wear to a minimum and giving the mixer a 50% longer life.

Our New Automatic Worm Dump is satisfaction itself.

Continuous Demonstrations at

Wettlaufer Bros.

178 Spadina Ave. Toronto, Ont.

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Specification by architects, engineers and contractors of Rogers Brand Portland Cement results in ***extra strength*** of concrete ***speedy*** construction, and ***stability and permanence*** of the finished work, especially in the ***bulkier*** concretes. Contractors have available ***reserve*** stock at ***near-by*** points for ***prompt*** delivery. These ***special*** Rogers organization advantages make for ***complete satisfaction*** and ***maximum profit.*** Rogers ***service*** is a feature that assists all parties contemplating work in Portland Cement Concrete.

Our Mills are located at Atwood, Durham, Hanover,
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N. J. Dinnen & Co., Western Sales Manager, Winnipeg

2

CLASSIFIED INDEX TO ADVERTISEMENTS—Continued

Pumps and Pumping Machinery
(Continued from page 6)
- Mussens Limited
- Ontario Wind Eng. & Pump Co.
- Smart-Turner Machine Co.
- Waterous Engine Works Co.

Quarry Machinery
- Canadian Rand Co.
- Improved Equipment Co.
- Johnston & Chapman
- George Anderson & Co.

Railway Supplies
- Ford Iron Co.
- Gartshore, John J.
- Hopkins & Co., F. H.
- Mussens Limited

Reinforcements, Concrete & Steel
- Ambursen Hydraulic Cons. Co.
- Canada Wire & Iron Goods Co.
- Factory Products
- Ford Iron Co.
- Greening Wire Co., B.
- Leach Contracting Co.
- Page Wire Fence Co.
- Steel Co. of Canada
- Trussed Concrete Steel Co.
- Turner, C. A. P.

Revolving Stone Screens
- Greening Wire Co., B.
- Johnson & Chapman Company

Road Machinery
- Erie Machine Co.
- Ford Iron Co.
- Hamilton Machinery Co.
- Huber Manufacturing Co.
- Morrison & Co., T. A.
- Mussens Limited
- Western Wheeled Scraper Co.
- Waterous Engine Works Co.

Roofing Materials
- Asbestos Mfg. Co.
- Can. H. W. Johns-Manville Co.
- Canadian Supply Company
- Galt Art Metal Co.
- Metallic Roofing Co.
- Metal Shingle & Siding Co.
- Noble, Clarence W.

Rubber Belting
- Goodyear Tire & Rubber Co.

Safes and Vaults
- Taylor, J. & J.

Sand and Gravel
- Sand & Supplies
- York Sand and Gravel Co.

Screens
- Greening Wire Mfg. Co., B.
- Johnson & Chapman Company

Sewer Pipe
- Britnell & Co.
- Canada Iron Corporation
- Dominion Sewer Pipe Co.
- Ford Iron Co.
- Gartshore Thomson Pipe Co.
- National Iron Works
- Ontario Sewer Pipe Co.
- Ontario Lime Association
- Smyth & Ryan
- Standard Drain Pipe Co.

Shovels (Steam)
- Browning Engineering Co.
- Beatty & Sons, M.
- Canada Foundry Co.
- Ford Iron Co.
- Hopkins & Co., F. H.
- Montreal Locomotive Works
- Mussens Limited
- Willis Shaw Mach. Co.

Smoke Stacks
- Des Moines Bridge Co.

Steam Apparatus
- Sturtevant Co., B. F.

Steam Turbines
- McDougall Caledonian Iron Kks.

Steel Bars
- Factory Products
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Steel Shingles and Ceilings
- Galt Art Metal Co.

Stone
- Britnell & Co.
- Brodie, Jas.
- Christie, Henderson & Co.
- Consolidated Stone Co.
- Contractors' Supply Co.
- Corinthian Stone Co.
- Crushed Stone, Limited
- Doolittle & Wilcox
- Hagersville Contracting Co.
- Laurentian Granite Co.
- Mahan & Company
- McMillan & Son, W.
- Morrison & Co., T. A.
- Myers, Oakley
- Queenstown Quarry Co.
- Roman Stone Co.
- Sackville Freestone Co.
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Stone Saws
- Anderson, Geo.

Store Fronts
- Canadian Store Front Co.

Structural Iron and Steel
- Canada Steel Co.
- Des Moines Bridge Co.
- Dominion Bridge Co.
- Factory Products
- Ford Iron Co.
- Mackinnon Holmes & Co.
- Steel Co. of Canada
- Phoenix Bridge & Iron Works
- Reid & Brown
- Sarnia Bridge Co.

Submarine Diver
- Rouleau, Joseph N.

Submarine Drills
- Canadian Rand Co.

Tanks and Stand Pipes
- Berg Machinery Co.
- Des Moines Bridge Co
- Inglis, John
- Jenckes Machine Co.
- Marsh & Henthorn
- McDougall Caledonian Iron Wks
- Ontario Wind Eng. & Pump Co.
- Piggott & Co., Thos.

Technical Journals
- Ainsworth & Sons, Wm.

Tents
- Turner & Sons, J. J.
- Woods Limited

Testing and Inspection Bureau
- Hunt & Co., Robt. W.

Valves
- Canada Iron Corporation
- Gartshore-Thomson Pipe Co.
- Kerr Engine Co.

Waterproofing
- Can. H. W. Johns-Manville Co.
- Ceresit Waterproofing Co.
- Chillas-Black
- Ontario Lime Association

Ventilating & Heating Apparatus
- Sturtevant Co., B. F.

Veterinary Remedies
- Johnson, A. H.

Water Softeners and Filters
- American Water Softener
- Berg Machinery Co.

Water Turbines
- Canadian Boving Co.
- Escher Wyss & Co.
- McDougall Caledonian Iron Wks

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- Canadian Boving Co.
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Wires and Cables
- Canada Wire and Cable Co.
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- Ford Iron Co.

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- Canada Wire & Iron Goods Co.
- Crescent Wire Iron Works
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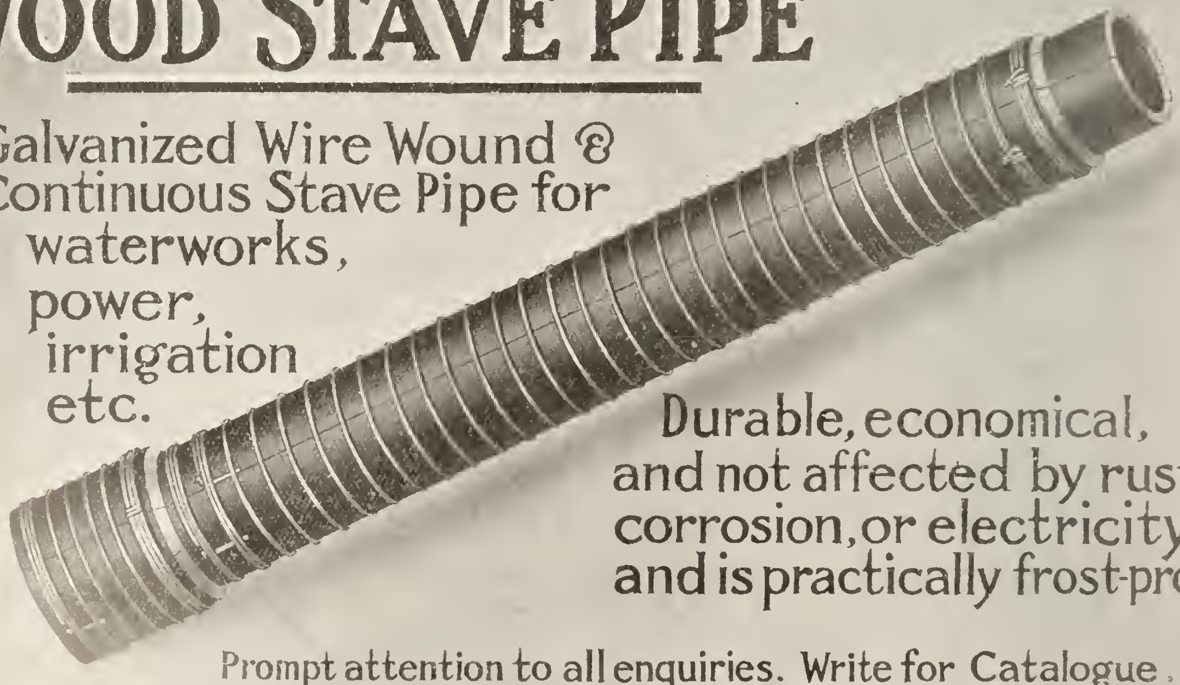

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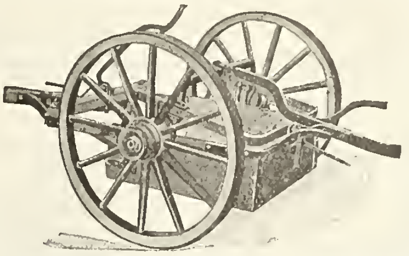

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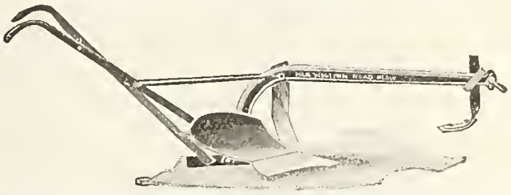
"Western" Line of Wheeled and Drag Scrapers and Grading Plows



The reason is a life-time's experience in actual contract work **combined with** an extensive manufacturing experience and every machine has been perfected after years of the most rigid tests,

Western Wheeled Scrapers, the pioneers and most extensively used characterized by square-shaped pans bent cold, general sturdy construction and many patented exclusive features. Built in any size.

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Western Railroad and **Township Plows,** designed for hardest service and proved by many years of use. Any size from 2 to 16 horse power.

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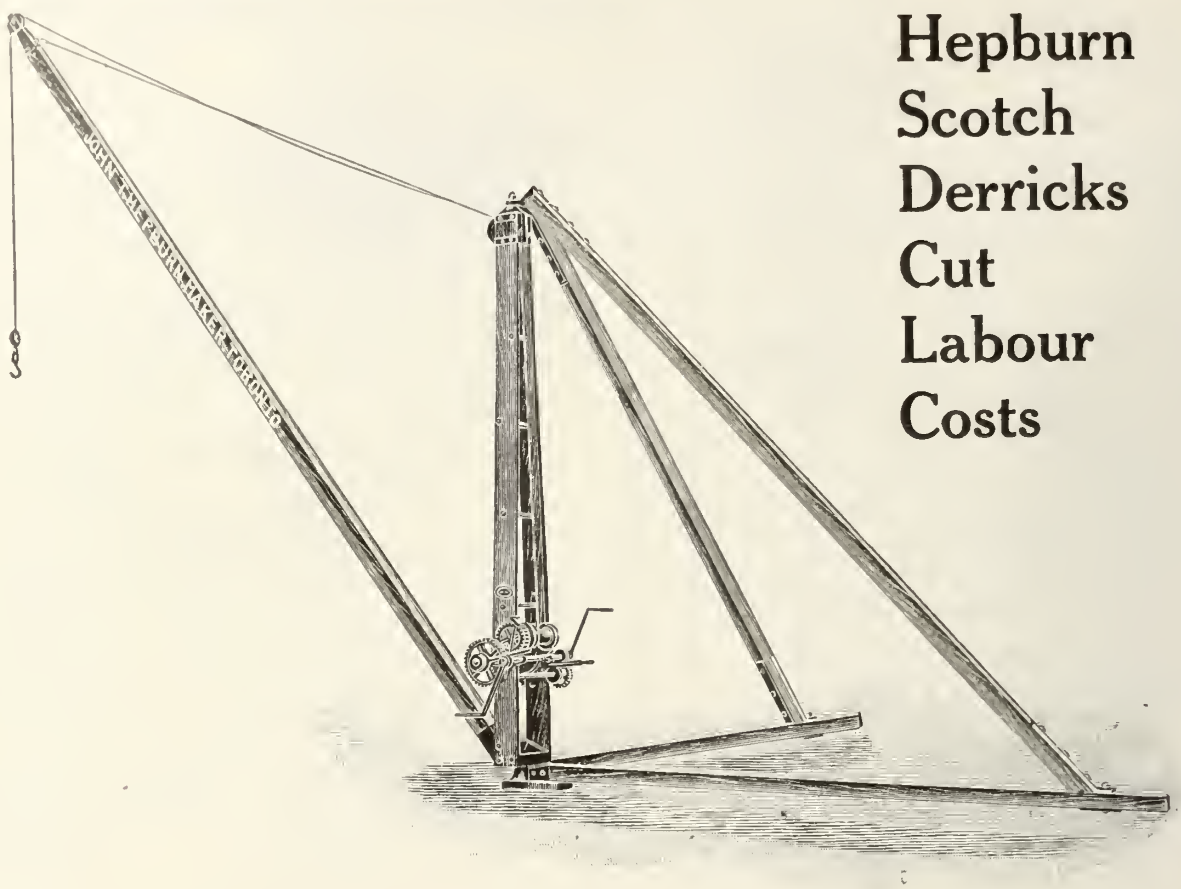
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Hepburn Scotch Derricks Cut Labour Costs

To Build a Good House You must have good materials

We build Derricks—and the same holds good. You get so **much more** out of a Hepburn Derrick, just because we put so **much more** into it.

¶ We use only the finest timbers. Each one is carefully selected for its special purpose.

¶ All castings are made in our own foundry. All forgings are forged by our own blacksmiths.

¶ From first to last Hepburn Derricks are Hepburn-made. We **know** every part is **right** before it goes in.

Our Derricks are made—and stocked—in standard sizes, from ½ ton up. We can ship interchangeable parts on short notice.

Let us send you prices and full particulars. Write today.

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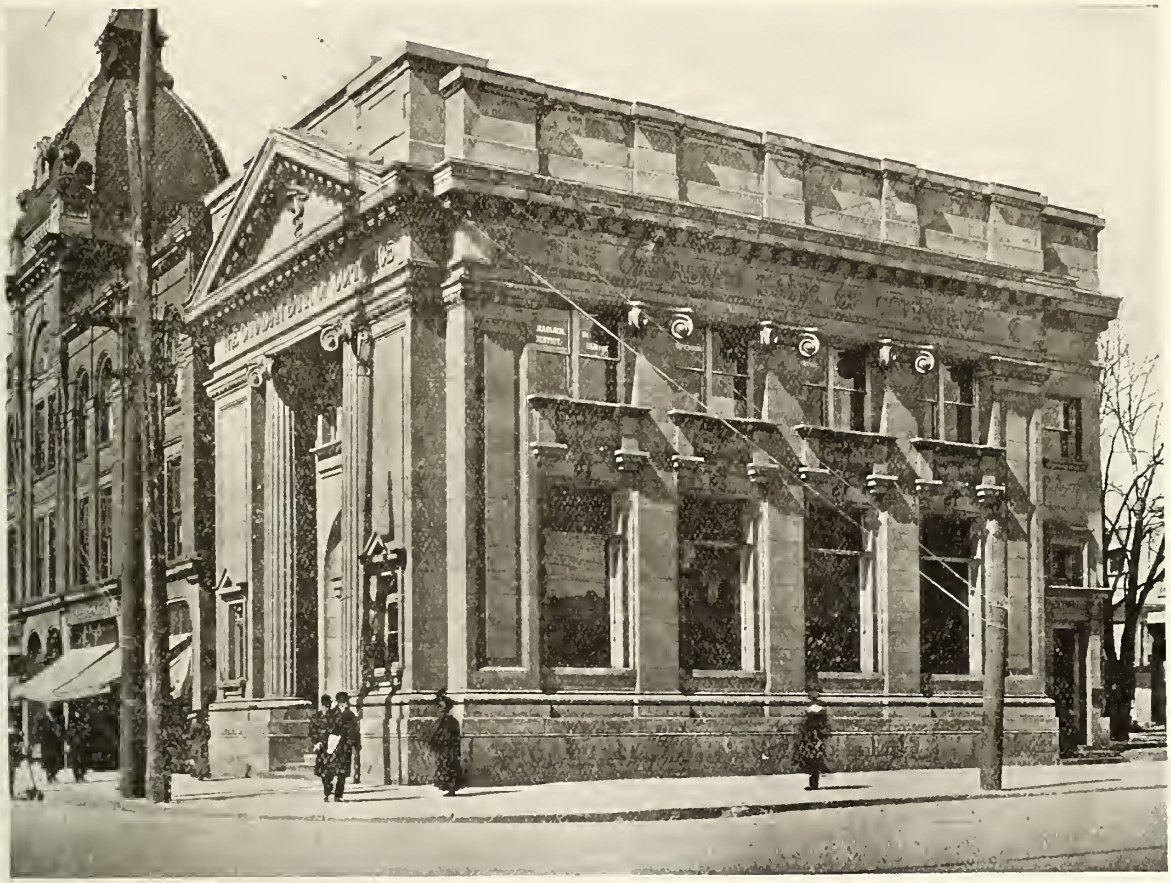

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ALPHABETICAL LIST OF ADVERTISERS

Abenaque Machine Works	86
Acme Equipment & Engineering Co.	36
Ainsworth & Sons, Wm.	25
Albert Manufacturing Co.	81
Alsen's American Portland Cement Works.	78
Ambursen Hydraulic Construction Company of Canada, Limited	
American Enameled Brick & Tile Co.	82
American Hoist & Derrick Co.	2
American Spiral Pipe Works	79
American Surety Company	82
American Water Softener Company	
American Well Works	
Anderson & Co., 1905 Ltd., George	22
Andresen, H. P.	
Asbestos Mfg. Co.	99
Automatic Wood Box & Turning Co.	82
Bain & Ross	92
Bates & Edmonds Motor Co.	23
Batts Limited	
Beatty & Sons Limited, M.	79
Beckman Company, L.	
Bell Filtration Co. of Canada, Ltd.	23
Bennett, Robert	98
Berg Manufacturing Company	103
Blystone Manufacturing Company	99
Bowman & Connor	92
Bremner Limited, Alex.	91
Britnell & Co., Ltd.	86
Brodie & Company, James	74
Brown Hoisting Machinery Co.	83
Browning Engineering Company	83
Buffalo Meter Company	27
Business Systems Limited	95
Bryan Manufacturing Company	108
Canada Cement Company, Ltd.	3
Canada Foundry Co., Ltd.	20-77-97
Canada Iron Corporation Limited	91
Canada Steel Company	31
Canadian Store Front Company	85
Canada Wire & Cable Company	23
Canada Wire & Iron Goods Co.	96
Canadian Boving Company	30
Canadian Bridge Co., Ltd.	88
Canadian Fairbanks-Morse Co., Ltd.	22
Canadian Kellogg Company	
Canadian Office and School Furniture Company, Limited	
Canadian Norcross Bros. Co.	18
Canadian Pipe Company, Limited	90
Canadian Rand Company, Limited	1
Canadian Supply Company	28
Canadian H. W. Johns-Manville Co.	107
Cement Era Publishing Company	13
Ceresit Waterproofing Company	106
Chain Belt Company	
Chipman & Power	92
Christie Henderson & Company	79
Cleveland Bridge & Engineering Co., Ltd.	88
Cleveland & Erie Mach. Co.	87
Cloisonne Glass Co. of Canada	
Colonial Glass Co. of Canada	
Cook, A. D.	
Commercial, The	87
Conduits Company, Limited	91
Consolidated Glass Company	
Consumers' Gas Company	
Consolidated Optical Co., Ltd.	
Consolidated Stone Company	
Contractors' Supply Co., Ltd.	86
Corinthian Stone Company	24
Cream City Equipment Co.	96
Crushed Stone Limited	95
Dahlstrom Metallic Door Company	101
Dennis Wire & Iron Works Co., Ltd.	90
Des Moines Bridge & Iron Co.	79
Dickson Bridge Works Co., Ltd.	
Doolittle & Wilcox, Limited	91
Dominion Bridge Co., Limited	88
Dominion Concrete Company	32
Dominion Creosoting Company	80
Dominion Marble Company, Ltd.	21
Dominion Sewer Pipe Co., Ltd.	21
Dominion Wood Pipe Co., Limited	12
Don Valley Brick Works	7
Down Draft Furnace Company	98
East Iron & Machine Company	78
Escher Wyss Company	101
Elaterite Paint Company	96
Eastern Pipe & Construction Co., Ltd.	106
Eaton & Co., T.	
Erie Machine Shops	37
Factory Products Limited	35
Farmer, John T.	92
Ferguson, H. S.	92
Ford Iron Company, Limited	8
Foundation Company	93
Fuce, Edward O.	92
Galt Art Metal Company, Limited	
Galt Engineering Co., John	92
Garlock Packing Company	84
Gartshore, John J.	92
Gartshore-Thompson Pipe & Foundry Company, Limited	90
General Machinery Co., Limited	98
Georgian Bay Shook Mills, Limited	111
Gibb, Alexander	
Goodyear Tire & Rubber Co. of Canada, Ltd.	33
Greening Wire Co., Ltd., B.	
Guarantee Company of North America	92
Gurley, W. & L. E.	85
Hagersville Contracting Co., Ltd.	13
Hamilton Pressed Brick Company	102
Hamilton Machinery Company, Limited	26
Hancock, Jr., H. Syd.	92
Harvey, J.	87
Heinicke Inc., H. R.	74
H. & E. Lifting Jack Company	106
Hepburn, John T.	14
Hobbs Manufacturing Co., Ltd.	
Holmes & Sons, Fred	79
Hopkins & Company, F. H.	112
Hotchkiss Lock Metal Form Co.	26
Huber Manufacturing Company	110
Hunt & Company, Robert W.	92
Hunter Bridge & Boiler Co., Ltd.	89
Imperial Wire & Cable Co., Ltd.	111
Improved Equipment Company	
Inglis Company, John	75
International Marine Signal Co., Ltd.	29
Jamieson Lime Company	100
Jenckes Machine Company, Limited	2
Johnston, A. H.	
Johnston & Chapman Company	
Kennedy, James C.	92
Kerr Engine Company, Limited	
Koehring Machine Co.	32
Laurentian Granite Co., Ltd.	92
Laurie & Lamb	107
Lea, R. S.	92
Leach Concrete Company	35
Leonard & Sons, E.	95
London Concrete Machinery Co., Ltd.	9
London Gas Power Company, Ltd.	76
Luxfer Prism Company	
Mace, T. Harry	92
MacKinnon Holmes & Co., Ltd.	94
MacLean Daily Reports	100
Marsh & Henthorn Limited	76
McCoy Company, Henry J.	25
McDougall Caledonian Iron Wks. Co., John	77
Mahan & Company	110
McMillan & Son, W.	110
McNally & Company, William	89
Meadows, George B.	35
Metallic Roofing Company, Limited	76
Metropolitan Paving Bricks Co.	31
Miller & Company, George M.	
Mitchell, Chas. H. & Percival H.	92
Mitchell Company, Ltd., Robert	88
Missisquoi Marble Co., Ltd.	82
Montreal Locomotive Works, Ltd.	95
Morrison & Co., T. A.	92
Munderloh & Co., Ltd.	13
Mussens Limited	4
Myers, Oakley	95
Municipal Engineering & Contracting Co.	34
Metal Shingle & Siding Company	34
National Bridge Co., of Canada, Ltd.	89
National Iron Works Limited	91
Neptune Meter Company	27
Noble, Clarence W.	78
Northwestern Terra Cotta Company	83
Ontario Asphalt Block Co., Limited	78
Ontario Lime Association Limited	81
Ontario Sewer Pipe Co., Ltd.	20
Ontario Wind Engine & Pump Co., Ltd.	95
Ormsby, Limited, A. E.	19
Owen Bucket Company	110
Pacific Coast Pipe Company, Limited	1
Page Wire Fence Company, Ltd.	
Pedlar People Limited	
Phoenix Bridge & Iron Works, Limited	89
Piggott & Company, Thos.	
Port Credit Brick Co., Ltd.	90
Power & Son	
"Prime White" Road Oil Company	
Pyle-National Electric Headlight Co.	17
Queenstown Quarry Co., Ltd.	91
Reid & Brown	92
Rhodes Curry Company, Limited	76
"R. I. W." Damp Resisting Paint Co.	17
Rogers Limited, Alfred	11
Roman Stone Co., Limited	15
Sackville Freestone Company, Ltd.	29
Sand & Supplies, Limited	89
Sarnia Bridge Company, Limited	89
Sheppard & Sons, James	84
Slack, T.	87
Smart-Turner Machine Co., Ltd.	1
Smith, Limited, Thomas & William	105
Smyth & Ryan	86
Standard Drain Pipe Co., Ltd.	21
Standard Foundry & Machine Company	37
Standard Ideal Company, Limited	36
Standard Scale & Supply Company	109
Steel Company of Canada	3
Steward, A. P.	74
Stinson-Reeb Builders' Supply Co.	
Sturtevant, B. F.	94
Taylor, J. & J.	
Tide Water Iron Works	81
Thew Automatic Shovel Co., The.	31
Thompson & Co., B. & S. H.	21
Tiffin Wagon Company	109
Toledo Wheelbarrow Company	
Toronto Furnace & Crematory Co.	
Toronto Plate Glass Importing Co., Ltd.	1-83
Troy Wagon Works Company	98
Trussed Concrete Steel Company	82
Turner, C. A. P.	
Turner & Sons, J. J.	99
Union Water Meter Co.	27
Universal Crusher Company	2
Urschel Bates & Company	10
Vulcan Iron Works	96
Wadsworth Howland & Co., Inc.	79
Waterous Engine Works Co., Ltd.	8
Watson Wagon Company	101
Watts & Son, E. R.	
Weeks, Arthur L.	9
Wells & Gray, Limited	108
Western Canada Contractor	86
Western Wheeled Scraper Company	1
Wettlaufer Bros.	10
Whitehead & Co., Ltd., John	
Wilson Bros., Ltd.	
Woods Limited	27
York Sand & Gravel Co.	86

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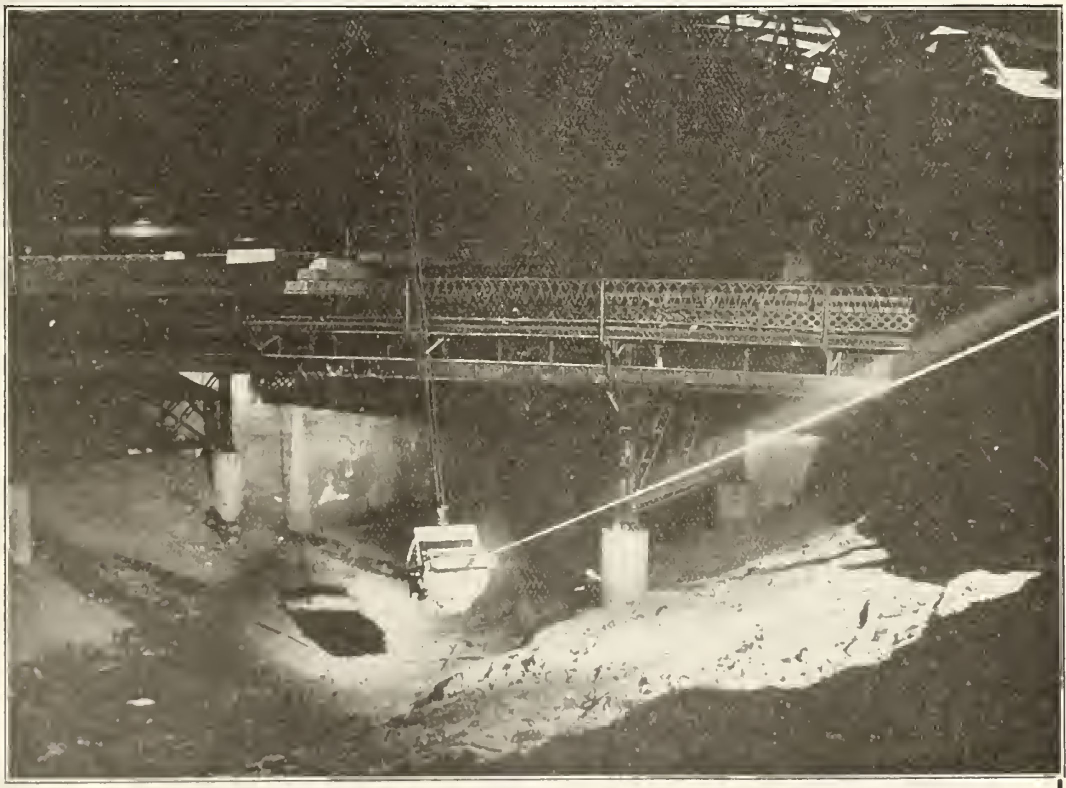
There are over 16,000 Pyle-Nationals in use. This is proof of their superiority. If you want more write for catalog.



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The Canadian Norcross Bros. Co.

Contractors

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Our Catalog is a Catalog of interest. It contains complete illustrations, tables of dimensions and some full sized details. This Catalog together with samples we wish you to have, Let us send it to you.

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Remember

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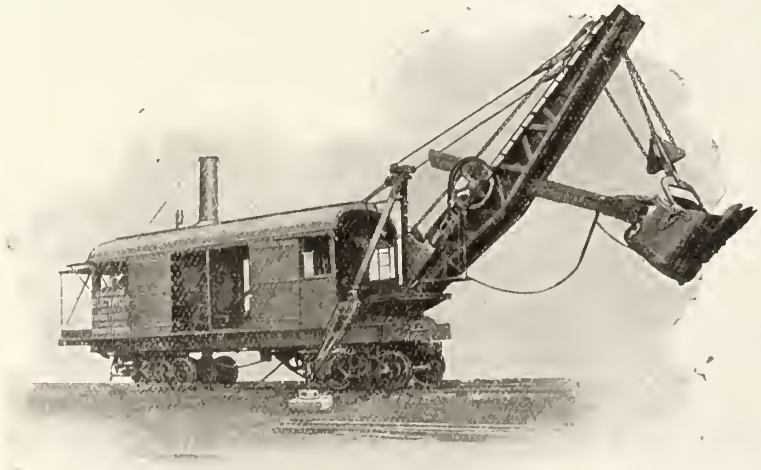
Canadian Bucyrus Steam Shovels



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One 45 ton Canadian Bucyrus Steam Shovel, the only one remaining of our last stock order, ready for shipment. More shovels now being built, can make short deliveries on any size.

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Two Factories:

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Sewer Pipes, Culvert Pipes, Chimney Linings, Hollow Building Blocks, Fire Clay, Stove and Range Bricks and all kinds of Fire Clay and Vitrified Goods.

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Impervious to Water.

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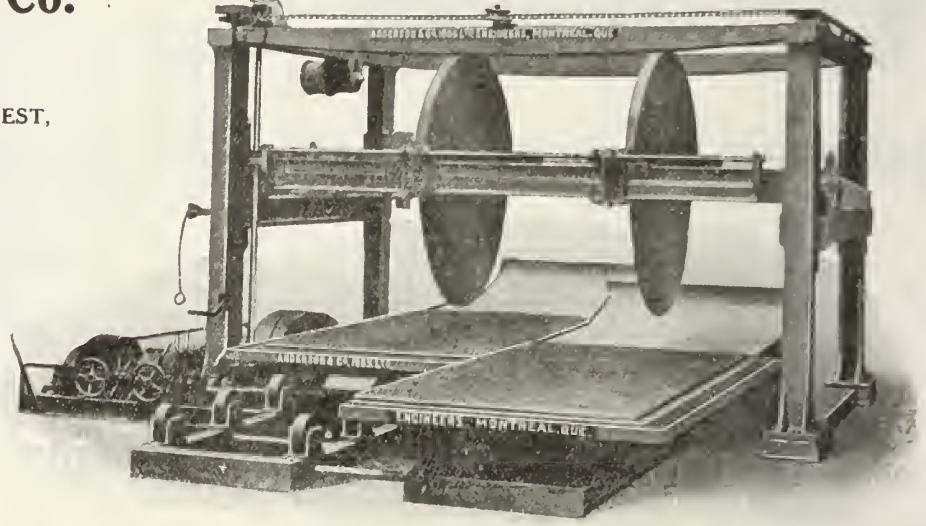

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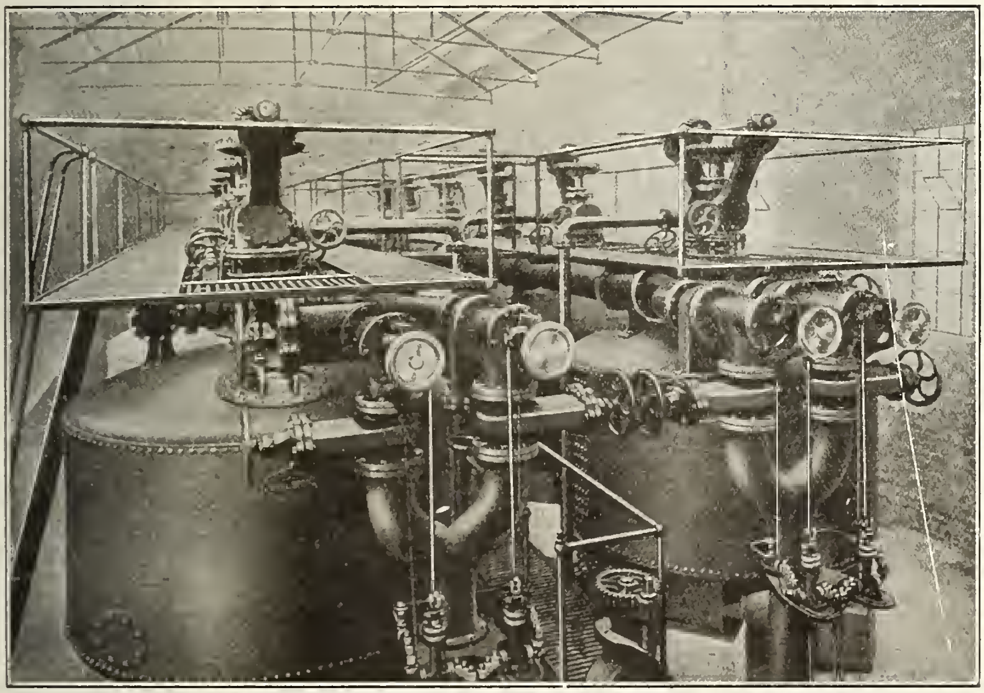

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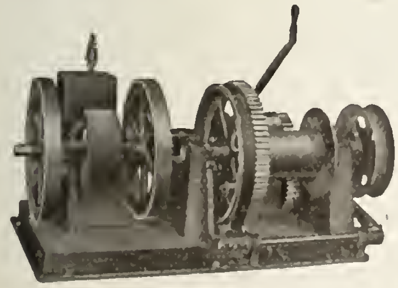

Hoist and Engine complete direct connected three sizes, 4½-6 and 8 H.P.

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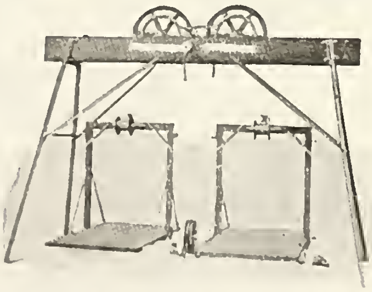
"A. R. Williams Machinery Co., Ltd., Canadian General Agents, TORONTO, ONT."



Double Platform Elevator for any elevation.

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The Stone for above was dressed to correspond with the old building
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Leach Concrete Co.

We have successfully executed in the last 12 months a score of contracts for reinforced concrete construction.

General Contractors
Specializing in

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Specifications are invited from Architects and Engineers.

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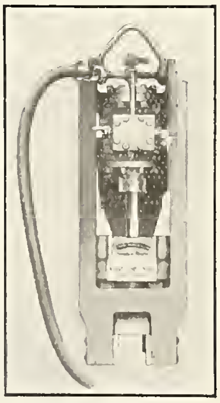
New Monarch Steam or Air Pile Hammer



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Steel Curb and Gutter Forms

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Time 200 Hours.
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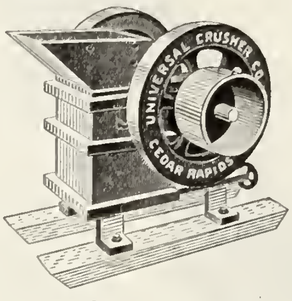

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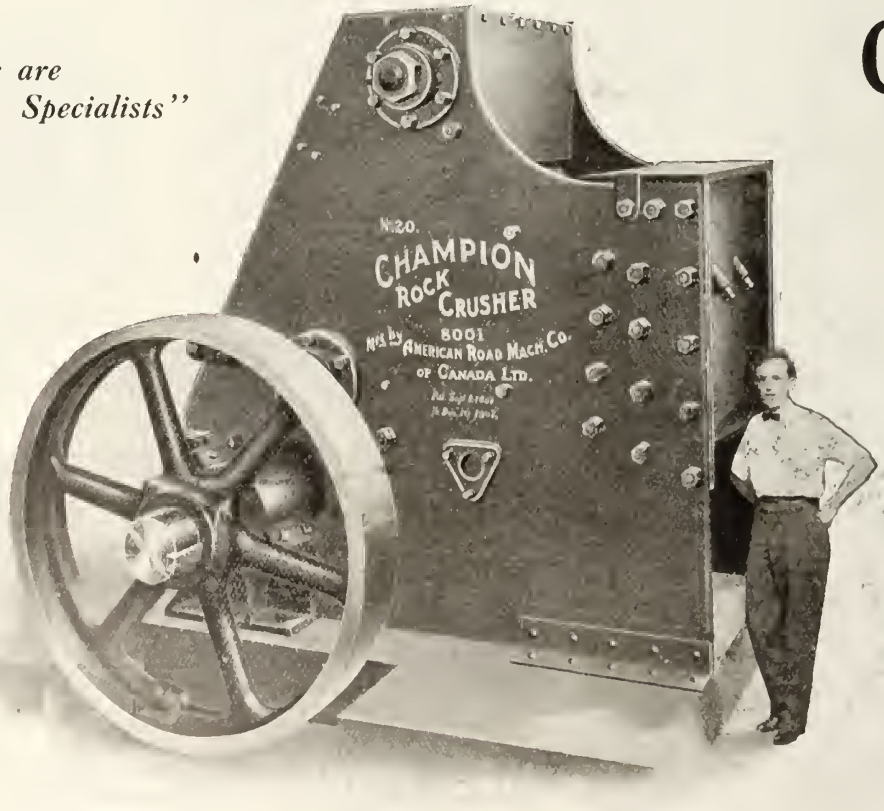

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Crushing, Elevating and Screening Machinery

We make a specialty of building and installing both large or small crushing plants, also gravel screening plants, excavators, etc. Write us for information — it places you under no obligations and we are always glad to furnish information regarding our machinery.

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Exclusive representative of the famous CHAMPION Road and Street Machines.

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Means Just This:

Accuracy, uninterrupted service, without frequent and expensive repairs and the application of the right principles of construction and operation to specific needs.

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Estimates given on built-up roofs of all kinds.

Arena Gardens, Toronto, will be roofed with Casco Built-Up Roofing

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OVERHEAD TRAVELLERS WORKED FROM ABOVE OR BELOW
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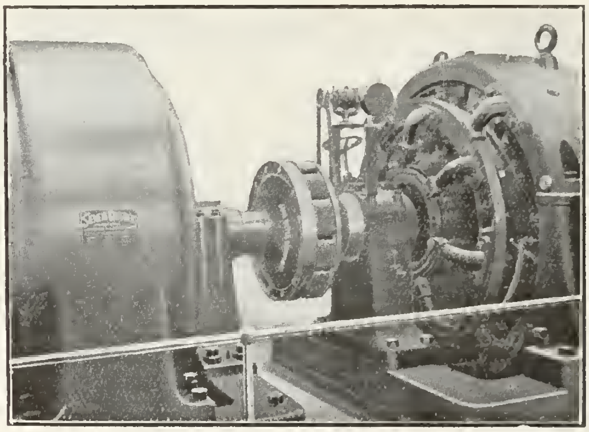

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PLAIN ROUNDS,
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MAXWELL
DEFORMED BAR

STEEL BARS
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Quality is Economy
in Paving Brick

"Three kinds of tests were made and the "Metropolitan Block" showed **stronger, tougher, harder** and **less porous,** than any of the others."

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Make Permanent Pavements**

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HORIZONTAL CROWDING MOTION
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The THEW SHOVEL has revolutionized the methods employed for cellar excavating, street grading, road construction, and light contract work in general.

The contractor whose equipment includes one of these light shovels, capable of doing the work of thirty or more laborers and economical if it replaces only four or five men, can underbid the contractor who is not so equipped. He can move a given yardage in a shorter time, at a lower cost, and with less trouble. He is recognized as up-to-date in his methods, is given an opportunity to figure upon the best jobs, and will usually receive the preference, other conditions being equal.

The THEW SHOVEL will handle cuts as shallow as 12 inches and give economical results. It will rip up old macadam and handle rough, stony ground most effectively.

Send for Catalogue. C.R.

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(Independent of all mergers)

Manufacturers of **STEEL** **For Reinforcing Concrete. Plain Rounds, Squares or Twisted Squares. Cross Arm Braces, plain and galvanized.**

ANGLES from ¼ x ¼ in. up to 2 x 2 ins.
ROUNDS and SQUARE from [illegible] in. up to 1¼ ins.

We can ship from stock

FLATS from ¾ in. up to 4 ins. in width, and other special sections.

Ask us for prices—they will interest you.

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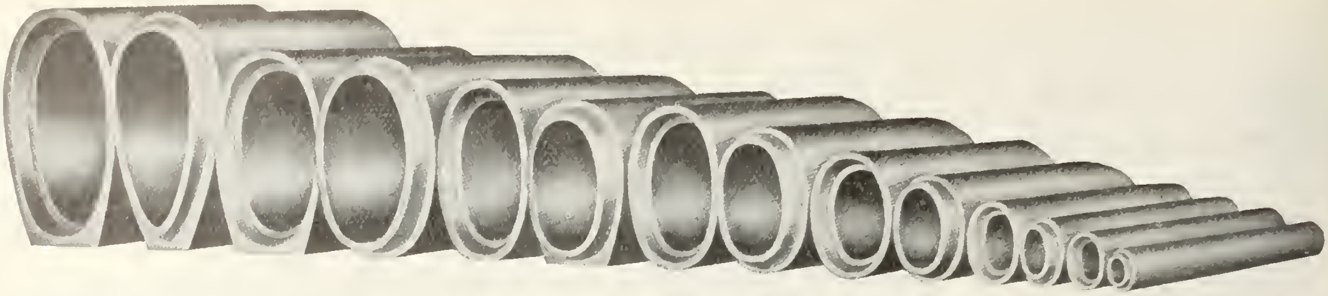

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properly built of properly made

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LAST FOREVER.

OUR MATERIAL, SYSTEM and PRODUCT have been tested and approved by EMINENT ENGINEERS. NO RUST, NO ROT, NO FROST-BREAKS, NO PRESSURE-BREAKS, NO HIGH PRICES, NO DELAYS IN PROCURING, NO TROUBLE IN HANDLING.

STANDARD REINFORCEMENT, or SPECIAL if required. Stock sizes 6 in. to 60 in.

Patronize Experienced and Reputable Manufacturers.

Catalogue and prices on application.

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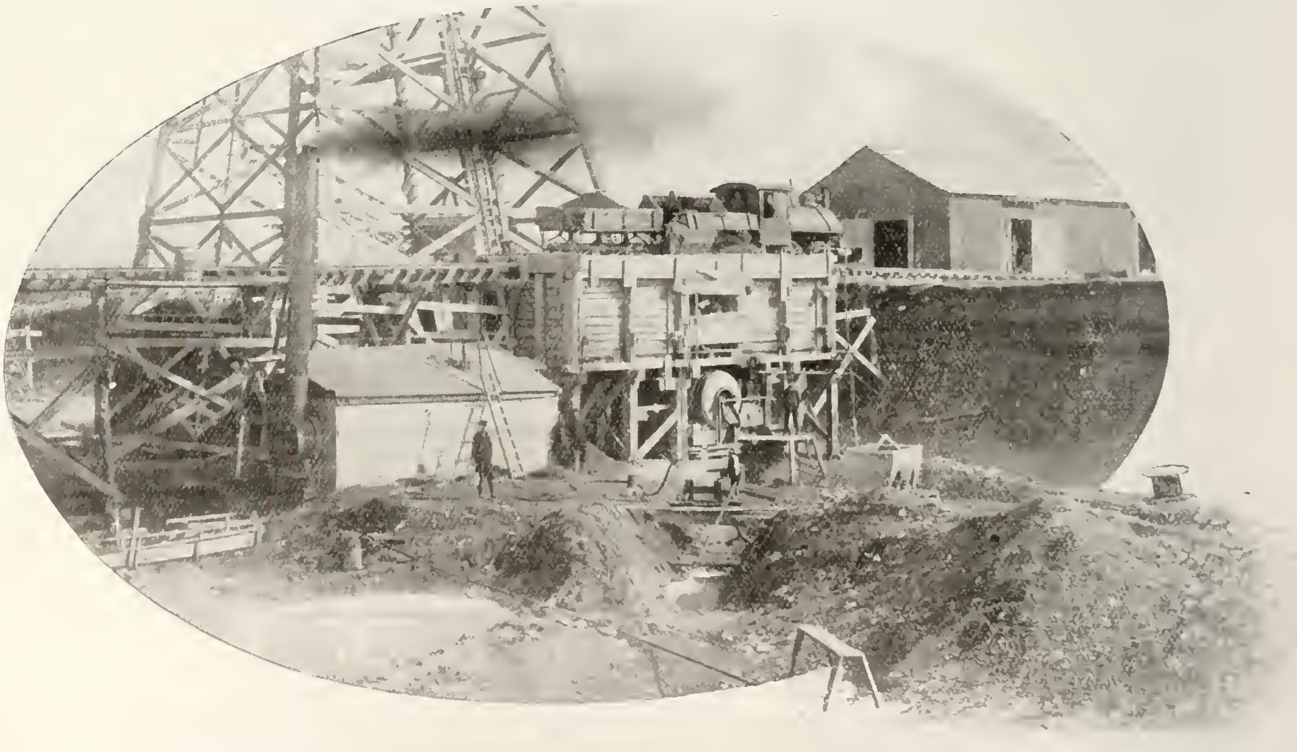
Kemptville, Ontario

THEY ARE ON THE JOB CONTINUALLY



When you have a **KOEHRING MIXER** on your work there is no shutting down or lay up for repairs. They are built so husky and of such durable material that continual operation can be depended on. Our new 1912 model is decisively superior to all other makes. Write for Catalogue No. 16.

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Don't let slipping belts waste power—drain away profits. Plug up the leaks—save time, money, *power*, by investigating—installing Goodyear Rubber Belting.

Goodyear Rubber Belting stands for *saved energy—economy.* Built up of plies of rubberized fabric, cured and vulcanized into the solid piece. Neither slips nor stretches. Has the cohesiveness of rubber with the enduring strength of a specially woven cotton duck fabric from which all stretch has been taken out. It is steam, water, weather and rot proof.

The same high grade materials, the same skillful workmanship and the same years of experience that have built such famous service into the products of the Goodyear Tire & Rubber Co., U. S, A., is doing the same for Goodyear Rubber Belting and our many other rubber products.

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High Efficiency Belting

Every size for every purpose—1 inch to 60 inches wide—2 plies to 8 plies thick.

Goodyear Quality Belting

The highest grade made. Heaviest duck, best rubber, seamless, tough, durable. The saving main-drive belt for **Paper, Pulp** and **Lumber Mills**—for *all* mills where the horse power transmitted is large and the demand for tensile strength is great.

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Lighter in weight, lower in price than above, but same in *quality.* Great quantities sold to **Sawmill** trade. Hundreds of mill owners say it gives better service than any other belt ever used.

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The ideal belt for **Thresher, Small Sawmill** and **Flour Mill** use. Built to meet competition, yet it is far superior to all other third-grade belts because made of tougher rubber, heavier fabric (which means better friction) and better wearing service and cover.

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We make this belting in **Quality, Black Diamond** and **Red Cross** weights for those preferring this type of belting.

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We make a specialty of **Elevator Belts.** Our Leg and Lofter Belts used in hundreds of elevators. Give superior service because of greater strength. Buckets never pull out. Plies never separate. Long efficient service guaranteed.

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For conveying crushed stone, grain, coal, ore, etc. Made in all thicknesses of face to suit requirements. Great toughness of Rubber face prevents cutting and chipping; insures longest service.

IMPERIAL HIGH-SPEED FRICTION SURFACE BELT

Specially designed for planer, dynamo, generator or fan work where pulleys are small and high-speeded. If we haven't what you want in stock, we'll *make* it—and *remember* **Goodyear Rubber Belts quickly earn their cost in pains and power saved—yet they cost less than the common kind. Let our expert solve your problem. Send requirements or write for catalog tonight.**

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(19)

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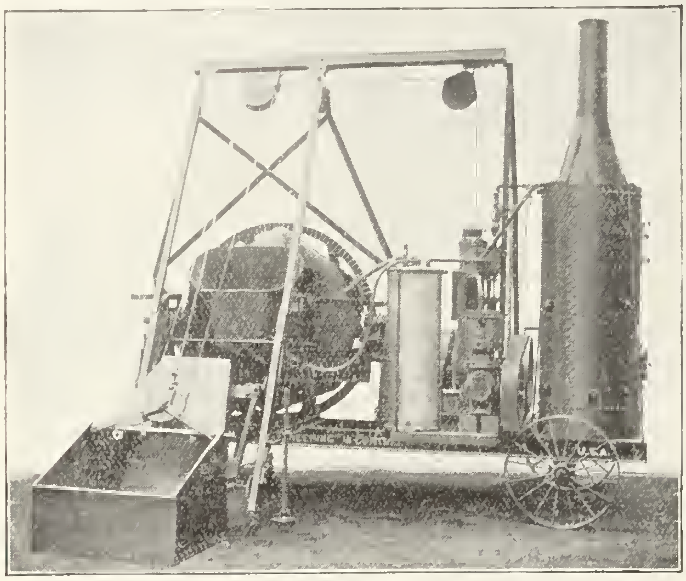

The customary method of laying asphalt pavement is crude and expensive. Not one-half the efficiency is obtained, because the asphalt is not properly laid. When cracks and holes appear the asphalt is blamed but when contractors cease pouring the liquid asphalt over the crushed stone, when they adopt the new Austin System of first drying the stone and then mixing it with the asphalt in a

Chicago Improved Cube Mixer with Austin Heating Attachment

they will get an even distribution of the asphalt over the stone and the mixture will set into a hard mass, thoroughly bonded together without weak spots. The cube can be charged and discharged without interrupting the delivery of heat, and two batches of hot asphalt can be turned out in from five to eight minutes.

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Specialists for 25 years in building high efficiency labor saving machinery for Engineering Work

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How to Build a Low Cost Fire-Proof Factory

Instead of tieing up a lot of money in a brick or stone building why not use corrugated galvanized sheets as many other wise manufacturers are doing?

ACORN Corrugated Sheets

only need a skeleton frame-work. They make the lowest cost permanent building you can erect. Their fireproofness secures for you the lowest insurance rate. They are rain, snow, moisture and wind-proof. Be sure you get ACORN QUALITY, for Acorn Corrugated sheets are the only kind made and galvanized according to British Government Specifications. They are TWICE as serviceable as ordinary sheets. If you intend building a factory we've valuable information we would like to send you. Write us at once.

Metal Shingle and Siding Co., Limited

PRESTON and MONTREAL

No Sir,

All steels are not alike! What other steel have you used where you were assured against broken punches, bad edges and risky welds

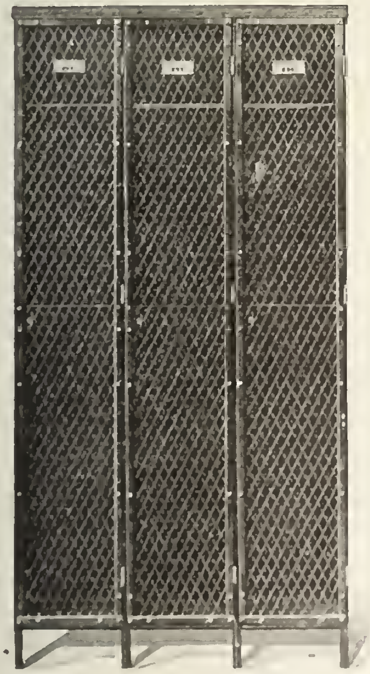
Carnegie Welding Steel
Carnegie Threading Steel

Immediate shipment from a clean stock in our
TORONTO WAREHOUSE

Send for Stock List.

Factory Products, Limited
STEEL DEPARTMENT
220 King Street West - TORONTO

'Meadows' Metal Lockers



Make friends because of their substantial construction and unique features. We make several styles and sizes of these lockers. We'll know what you want if you just hint at your requirements.

Send for our interesting booklet entitled
"Locker Lore"

GEO. B. MEADOWS
Toronto Wire, Iron and Brass Works Co., Limited
TORONTO, CANADA

Manhole Covers
That Fit Snugly

Every city and town requiring street openings should see that only the best manholes are used.

We make a specially reinforced manhole cover that fits snugly and is unusually strong.

Our other products include Building post caps, plates and hangers, scruppers and brass castings.

The Standard Foundry & Machine Company
Dunnville, Ontario

Doud's Combination Bucket and Car

The most flexible outfit for the construction of monolithic concrete sewers, retaining walls, and that class of construction where a light industrial track can be laid over the forms and the car run from the mixer out along the track, and the concrete let into the forms in just as small quantities as desired, and at the same time any portion of the load cut off if necessary.

The bucket or body part of the car can be lifted from the trucks by a derrick and used as a controllable Discharge Bucket if desired.

Doud's Controllable Discharge Bucket

The most perfect Controllable Discharge Bucket made, because it has the most powerful leverage for controlling the gates, and is self supporting, requiring no special platform to hold it in an upright position. It will ride on any old flat car the same as any old flat bottom bucket. It is *grout proof* and *one man can operate it.*

Get our catalogue descriptive of our Concrete Spreader Cart for paving work. IT'S THE BEST CART MADE.

The Acme Engineering & Equipment Co.
GARFIELD BLDG., CLEVELAND, OHIO.

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GENERAL OFFICES AND FACTORIES · PORT HOPE · CANADA

THE STANDARD IDEAL

Automatic Individual Bowl Syphon Action Range Closet

The most perfect range closet ever produced.

Write for our Booklet "E"

showing our Range Closets and Urinals and giving roughing measurements.

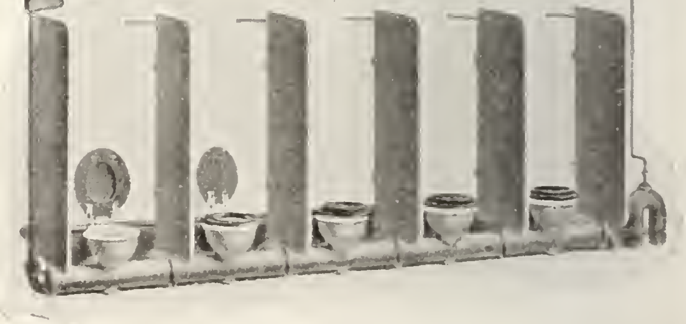

Plate F. 517

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TORONTO
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Contract Record
and Engineering Review

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Alphabetical Index of Advertisers
Page 16

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Conditions and Outlook in Construction Work

IN Canada generally the present winter has been a season of gratifying activity, despite the fact that the exceptionally cold weather experienced at times exerted an unfavorable influence on industrial and labor conditions and held up outside construction work. Throughout the country nearly all the various shops and factories have been working full time and general trade conditions are most encouraging.

Montreal and District.—At Montreal, the building trades have been very quiet, although there is every indication that the coming season will be a record one. Undoubtedly the constructional interests will be benefited by the extensive plans of the C. N. R., which involve an expenditure of $25,000,000. The greatest single item, of course, in this programme is the tunnel under Mount Royal which will be over three miles long and cost in the neighborhood of $6,000,000. The C. N. R. have purchased sites for their terminal and in addition to the erection of a large station they will probably build an hotel.

The appropriation of $10,000,000 for road work in the province of Quebec is another most important undertaking the consummation of which will mean much to the city of Montreal. The extensions planned by the Montreal Harbor Commissioners involve an expenditure of $2,000,000, while the public works to be carried out in 1912 in Montreal and district by the Dominion Government include upwards of one and a half million dollars for buildings. Of the noteworthy building work may be mentioned the new Customs Examining Warehouse, estimated to cost $300,000; the enlargement of the Montreal General Post Office, estimated to cost $200,000, and the new Court House, estimated to cost $250,000. Apart from the railway, municipal and government projects, private enterprise is very much in evidence. Plans are already announced for the erection of a number of large office buildings, including two ten-storey structures. Hotels and apartment houses also figure largely in the season's programme, while in the suburbs residential building will be more active than ever. Of the larger structures planned to be erected this season at Montreal are the Ritz-Carlton Hotel, the Mount Royal Hotel, and new buildings for the Bank of British North America and the Royal Trust Company. Several churches and a number of small theatres will also be built.

There has been no conflict with labor of late, although this may be a superfluous statement considering the season of the year. In view of the agreements now in force it is not expected that there will be any serious differences between the master builders and the various trades. The only thing that may be predicted with certainty, however, is a difficulty in obtaining sufficient labor. This applies not only to the Montreal district, but to the whole of Canada.

Toronto, and Ontario Generally.—In Toronto, the recent cold snap was responsible for a general suspension of the activity in building, but an unusual volume of indoor work has been completed during the winter months. The various manufacturing companies in the city have had no trouble in keeping their plants in full operation. An instance of the condition in this field is afforded by the fact that quite recently the agricultural implement shops of the Massey-Harris Company were closed down temporarily owing to the warehouse being too full to accommodate the output. Incidentally it may be observed that in the spring this company will start the construction of another large warehouse which will give an additional four acres of floor space. In the labor field the only development worthy of note has been a notification from the carpenters' union that a substantial increase over the present minimum wage of 37 cents an hour will be asked in the spring.

The conditions experienced in Toronto reflect very fairly those obtaining in nearly every other city of the province. Skilled labor in most lines is well employed. Municipal engineers everywhere are working overtime perfecting their plans for an early start at the opening of the construction season. There is general belief that the constructional achievements of other years will fade into insignificance beside those of 1912.

Western Canada.—In the west, conditions have maintained a good average. The building trades, of course, have been quiet, little outside work having been possible. The west figures very largely in the government estimates, and the public works to be undertaken this season will stimulate further activity in other lines. Municipal activity is everywhere in evidence. In Edmonton, for instance, the expenditures on municipal extensions and improvements durin 1912 will exceed four million dollars.

Speaking of municipal work, Victoria, B.C., shows up well with a prospective expenditure of three or four million dollars. This city is pushing ahead very aggressively and great things are expected during the coming season. The building expenditure for Greater Victoria last year totalled nearly five million dollars.

The Supply Market.—The market is characterized by a good demand in nearly every department. In Toronto there continues to be a brisk call for cement, but higher prices are not anticipated, particularly in view of the expressed policy of the Canada Cement Company. As usual, the brick manufacturers are very busy. There is a good movement in pressed brick and the higher grades. For pressed brick Don Valley quotations are $18 delivered and $17 at the works. Car lots of cement are quoted at $1.65, sacks extra, while city dealers ask $1.90, sacks extra. Prices of lumber are practically unchanged. Winnipeg's present quotations are uninfluenced by the preparations that are being made for the coming season, although no great changes are anticipated during 1912. Lumber is in demand and will probably reach higher levels in Western Canada. Iron and steel works in Winnipeg are reported working at full capacity. Cement is selling there at $2.50 to $2.60 a barrel. Building brick are quoted in three grades at $11, $12 and $16 a thousand.

Railroad Work.—In the field of railway construction little actual work has been accomplished during the last two months, but preparations have been made for extensive operations later on. No less than sixty million dollars will be expended on railroad construction in the four western provinces during the coming season. In Winnipeg, the employment agents have been busily engaged in securing men. It is estimated that about 50,000 will be required in Western Canada for the lines already projected bv the principal railway companies.

As announced previously in these columns, the General Manager of the Grand Trunk Pacific estimates the value of the work outlined in the company's programme at $20,000,000. It, is expected that about 600 miles of branch lines will be completed by this railway during the present year.

The government of Alberta will construct four new lines: one from Athabasca Landing to Fort McMurry, another from Athabasca Landing in a northwesterly direction to Peace River Crossing, a third from Edmonton to the Grande Prairie country south of Peace River, and a fourth from Edmonton to a point near Cold Lake on the eastern boundary.

The projected lines of the Canadian Northern Railway include one from St. Jerome to St. Eustache, Que., the extension of the Ottawa-Pembroke section to Port Arthur, and one from Gowganda Junction easterly to North Bay, connecting at the former point with the line from Toronto.

The Canadian Pacific Railway Company have an active season in prospect. Most of their new work is in Saskatchewan and Alberta. The appropriation for betterments and construction is $20,000,000.

Waiting for Opportunity

The man who waits for opportunity to come knocking at his door will wake up some morning to discover that he has made nothing of himself and that he has outlived his usefulness and grown grey doing it.

The man who wants success in any line to-day is the one who rolls up his sleeves, starts out with a club, a gun, a steel trap, or what is most likely to catch the game, and himself lays in wait for opportunity. He will be following opportunity every minute he has. He will be striving and working, pushing and hustling. Sometimes he may lose sight of the game, but he will keep on and on.

When a man goes hunting in the woods he tramps where game ought to be until he finds tracks. Then he follows the tracks. Maybe he gets a glimpse at the game occasionally, but he keeps on and on. Probably not more than once or twice in a while will he see what he seeks, but finally he comes upon it in the open, and it is his. Just so with opportunity. Search for it!

Automobilists and Good Roads

At the annual dinner of the Ontario Motor League held at the King Edward Hotel, Toronto, on the evening of Tuesday, February 28, an address was given by Mr. Paul D. Sargent, of Washington, D.C., assistant Director of the United States Bureau of Roads. Mr. Sargent showed that nearly every one of the good roads associations now flourishing in his country had reached success through the efforts of automobile enthusiasts. The motor societies had grown side by side with the good roads movement and their interwoven objects made each essential to the other. Official action had now been taken by the governments of 37 States, which had established permanent highway departments as a result of the movement. It was necessary for the cities to come to the aid of the county municipalities in road-building, the speaker held, because difficulties of financing prevented the latter from succeeding unaided. The introduction of Federal aid was also a great step in advance. In this respect he understood Canada to be ahead of the United States. There the first real effort had been made directly through the automobile interests, a great convention of motorists having recently resolved to ask Congress to appoint a commission to investigate and advise on the whole matter of government assistance to road-building.

Recent Developments in Sewage Disposal

Some interesting observations on the above subject were made by Mr. Geo. W. Fuller, consulting engineer, New York City, at the annual meeting of the Connecticut Society of Civil Engineers, held last month at New Haven. Mr. Fuller referred to the growing knowledge of the methods of sewage purification as exemplified by the great number of experimental investigations which had been carried on in this country in the past ten years. He presented a table showing the names of the cities where such experiments had been made and the amount of money expended at each of the places. Using as illustrations the views of a number of recent sewage-disposal plants, the speaker then showed some of the latest developments in this line of work. The main novelty which he described was the Imhoff combination sedimentation and septic tank, which has been installed in some three or four plants in this country, but which has reached a much greater use in Germany, where it was invented. Finally, Mr. Fuller brought the attention of the society to the necessity of sufficient maintenance of sewage-purification plants. He said that one of the most important functions of this society was to persuade public officials of the uselessness of employing an engineer to design a complicated sewage plant and then putting such a plant in the hands of entirely inexperienced men. Many failures of plants could be attributed to this cause.

Mr. W. J. Ker, New Westminster, President of the Canadian Highway Association, is offering one gold and two silver medals for the best essay on "What Good Roads Mean to Canada." The competition is inaugurated with a view to developing the young idea and is confined to young people of either sex under eighteen years of age. Students in all parts of Canada are eligible and there are no hard and fast rules as to the length of the essay, although articles of 800 to 1,000 words are suggested. Essays must be written on one side of the paper only and must be in the hands of the Secretary, Mr. P. W. Luce, 614 Columbia St., New Westminster, on or before May 1st. The medals will contain on the obverse a reproduction of part of a Canadian highway, encircled by the words, "Canadian Highway Association, 1912," and on the reverse the name of the winner.

Publicity for Brick

Messrs. Gunton Bros., of Norwich, Eng., have favored us with photographs of their recent exhibit at the Royal Show. One of these is reproduced herewith. The work shown is an excellent example of the artistic possibilities of brick work and incidentally it furnishes a strong argument in favor of the brick manufacturers' seeking a wider field and doing more in the way of educating the public.

The church shown herewith is the Roman Catholic Church at Lowestoft, Eng., and was designed by Messrs. Baines & Son, of London. The building commends itself as a particularly fine piece of brick work. The whole of the doorways, copings, finials, and other moulded work were manufactured by Messrs. Gunton Bros.

Brickwork Exhibit by Messrs. Gunton Bros., Norwich, Eng.

Concreting in Winter

Concreting in winter at temperatures not exceeding 10 deg. to 15 deg. Fahr. was successfully carried on in the case of a large reinforced concrete warehouse at Delavan, Wis. The outer walls of the structure were of brick and were built up to a height a little above each floor level before the concrete was poured. The concrete plant was in the basement and the materials were heated by steam passing through a large coil of 1½-in. pipe exhausting into the water barrels at the concrete mixer. The materials were dumped directly over the steam pipe, which was laid in the form of a continuous coil. It was considered that this arrangement afforded better circulation of steam heat than the use of parallel pipes and headers. At first exhaust steam was used in the coils, but later the full boiler pressure was employed and it is stated that the latter method gave much better results. In this way the temperature of the concrete was kept beween 50 deg. and 60 deg. After the concrete was poured, it was covered with canvas and salamanders were placed on the floor below, one salamander being employed to about 600 sq. ft. of floor space.

Five steel girders ranging from 80 to 90 feet in length, and used by the Baltimore & Ohio Railway in Columbus, Ohio, are being encased in concrete as a protection against corrosion. Steel girders require frequent painting to prevent rust, and this treatment by concrete will eliminate all this expense. The operation was carried on as follows: the rust was scraped and brushed off; No. 10 Clinton wire cloth was wrapped over the top and bottom flanges and around the columns; the stiffer angles on the girders were punched, and 3/8-inch round rods threaded through lengthwise of the bridge on twelve-inch centers; and the forms were built around the girder in such a way as to give a thickness of concrete of about six inches on all sides. The forms were built one panel length at a time on the ground, and hoisted to position. A 1:2:4 mixture was used, poured rather wet. After four or five days, the forms were removed and the outside surface floated to a smooth and even finish. The finished appearance is that of a concrete girder bridge, there being nothing to indicate the steel interior.

Roman Catholic Church at Lowestoft, Eng.

The city council of Vancouver, B.C., are taking a leaf out of the records of Port Arthur. A year or so ago the council of the latter city decided to regulate the incomings and outgoings of their employees by a time clock, which everyone was required to "punch"—from the city engineer downwards. As a result they lost their city engineer. The city officials of Vancouver are now considering the same innovation. We do not say that any inference can be drawn, but the signs are certainly ominous for Mr. Fellowes. At the time of writing, the suggestion has not bten adopted. For the sake of a number of friends we possess in municipal engineering circles we should regret very much to see the system adopted generally throughout the country.

Features of Large Rock-Crushing Plant

Heavy Equipment gives Daily Capacity of 500 Cubic Yards to Single-Unit Plant—Trackage Arrangements and Other Facilities

By Samuel W. Traylor

THE rock crushing plant now being erected at Valhalla, N.Y., about thirty miles north of New York City, to prepare stone for the concrete used in the construction of the Kensico dam of the Catskill water supply system, is described by Mr. Samuel Traylor in the Engineering Record. The plant is equipped with very large machinery to give a maximum capacity of 500 cubic yards per hour in a single-unit installation. The dam is to be of cyclopean masonry, faced on its upstream side with concrete blocks and on its downstream side with cut stone, and will contain over 1,000,000 cubic yards of masonry, thus making it take rank as the largest masonry dam in the world. At one point, where the foundations are 130 feet below the surface, the total height will be 300 feet.

The Quarry and Its Equipment.—The quarry at the dam site extends along the edge of a granite ridge a distance of 3,000 feet. The pneumatic drills used in quarrying are of the largest make, boring a 5-inch hole to a depth of 20 feet. Four 90-ton, 4-yard steam shovels will be used in loading the rock into the quarry cars. The transportation facilities consist of four 40-ton locomotives, each handling a train of 15 to 20 cars of 8 cubic yard capacity. The loaded trains are hauled into the crushing plant, where the cars are mechanically dumped into a chute leading to the initial crusher. The train is then hauled through the crusher building and returned to the quarry over a separate track.

The Plant.—The initial 5 x 7-ft. crusher reduces the rock to a size of 9 inches and finer, which then passes over a grizzley with 4½-inch openings, the undersize product going to the elevator, while the oversize is run through the second crusher with an opening 3 x 6 ft., reducing it to 4 inches and finer. This product, with the undersize from the grizzley, then goes to the elevator and is raised to a 7 x 30-ft. screen. All material ¼ inch and finer is removed by the screen for a sand product and is stored separately, while the aggregate or stone between ¼ and 2½ inches is distributed by a 30-inch conveyor into a 10,000-ton storage bin. The oversize from the screen goes to a small bin, which is equipped with a 28-inch steel-pan feeder and is delivered to a heavy-duty 60 x 30-inch crushing roll; the product from this roll being returned to the same elevator and screen.

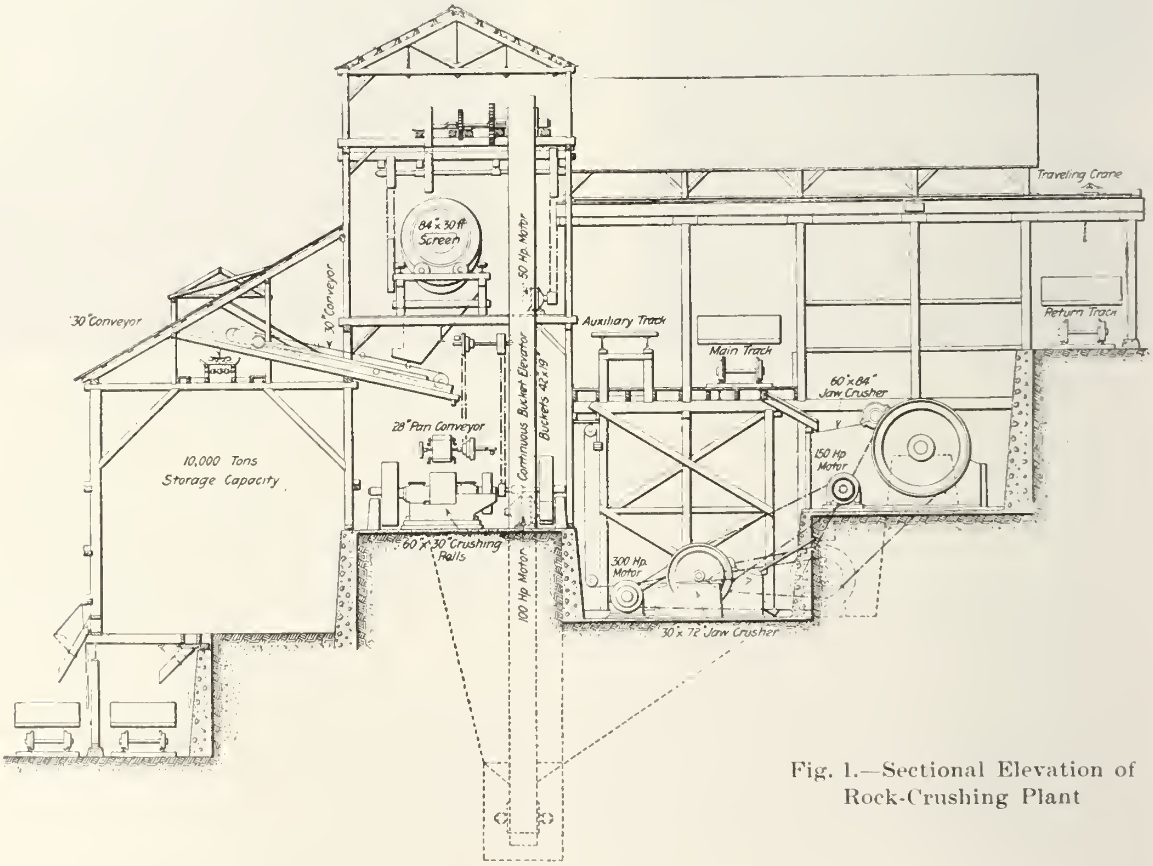

Fig. 1.—Sectional Elevation of Rock-Crushing Plant

The storage bins have bottom and side discharge gates permitting of loading standard-gauge cars running under the bins, as well as at the sides, preventing congestion at this point and making available the full storage capacity of the bins by reason of the many points of discharge.

Reference to the side elevation, Fig. 1, will show the simplicity of design and economy in operation, as well as the small number of individual machines required for so large a capacity. This view shows all of the principal machinery.

It would require not less than nine gyratories to do the equivalent work of this plant, and though a No. 21 gyratory be used as the initial crusher, all rock coming from the quarry must be broken to a size of 3 feet or smaller before it will enter the crusher. The necessity of breaking the quarry product to 3 feet and smaller adds materially to the cost of operation of a gyratory plant. The initial crusher here, however, will take any piece of rock that will ordinarily come from the quarry, and this greatly reduces the cost of quarrying, handling and crushing. It is estimated that the amount of this saving over the largest single-unit gyratory plant will be at least 10 cents per ton.

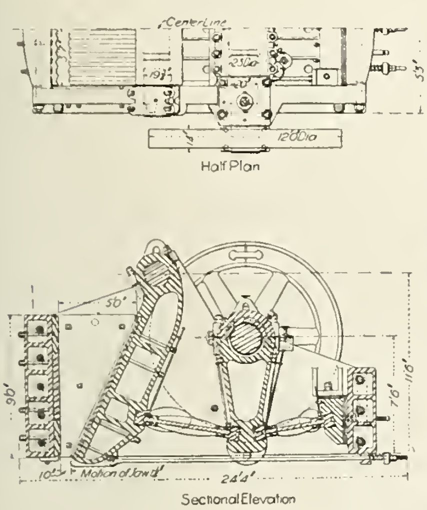

Fig. 2.—Details of Jaw Crusher

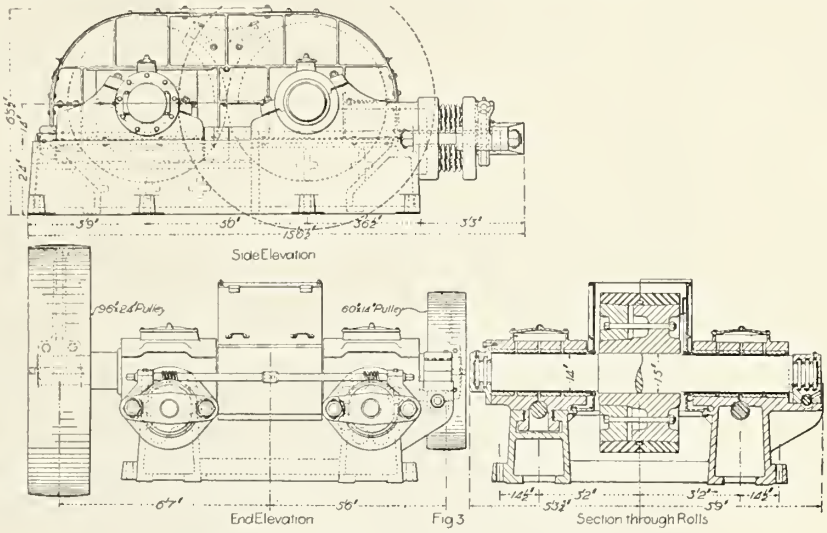

Fig. 3—Details of Crushing Roll

Repairs are of small moment in this plant, as it is estimated that all wearing parts of the crushing machinery will last for two years or more in continuous operation without having renewals.

Some of the novel features of this plant are the trackage arrangements and the facilities for loading and unloading all products during construction, there being provided a standard-gauge track along the upper side of the plant, over which a crane runs into the crushing building, facilitating the handling of the heavy machinery directly from the railroad cars. When the plant is completed this track will be used for returning the empty cars to the quarry. The crane is so located that it may be used to advantage for removing pieces of rock larger than 7 feet which may get into the plant by accident, and so avoids that possibility of congestion.

There are two main delivery tracks running through the building, and a heavy chute extends from each track to the initial crusher. Only one track will be used at a time, the other being an auxiliary for use in case of mishap or obstruction, to avoid closing down the plant. These tracks are so arranged that the initial crusher can be closed down and the rock fed directly to the second crusher, this being desirable should the rock from the quarry be running in small sizes, which would enter the second crusher without difficulty, thus saving both the large crusher and expense in power. This arrangement also permits repairs on one machine without closing down the whole plant.

Unloading Device.—A special unloading device is supported by the crane over the large crusher, the delivery tracks and chutes. It consists of an air lift, with 20-inch cylinder, working under a pressure of 80 lb., and having a lifting capacity of 10 tons. As the cars pass in front of the chutes, one man dumps them quickly by hoisting one side of the car.

Large Crusher.—The initial crusher has a jaw opening of 5 x 7 feet, and will take a stone weighing 10 tons and reduce it within one minute. This crusher is of cast steel throughout, excepting the fly-wheels, and has a total weight of 450,000 lb. The fly-wheels are 12 feet in diameter and weigh 15 tons each. The swing-jaw shaft is 20 inches in diameter and weighs 6 tons, while the pitman shaft is 24 inches in diameter in the pitman and 20 inches in the bearings, and weighs 8½ tons. The swinging jaw is 13 feet in length by 7 feet wide, and weighs 74,000 lb. The wearing plates are made entirely of manganese steel in sections which are interchangeable, so that they may be changed about from time to time to increase their life. All bearings are water-cooled, and compression grease cups, 12 inches in diameter are provided as integral parts of them. The overall length of the crusher is 24 feet, the width 15 feet and the height 13 feet. The construction of this machine is shown in Fig. 2.

Second Crusher.—The second crusher has an opening of 3 x 6 feet and is of the same type as the large one, with an overall length of 13 feet, width 13 feet, and height 9 feet. The swing-jaw shaft is 12 inches in diameter, and the pitman shaft 14 inches in the pitman and 12 inches in the bearings. The fly-wheels are 8 feet in diameter by 12 inch face, and have a peripheral speed of 5,000 feet a minute, being operated at a speed of 200 r.p.m. The total weight is 210,000 lb.

Elevator.—The location of the plant requires the raising of all product, after passing the second crusher, to the screen. The elevator is of the continuous type, each bucket being 42 inches long, 18 inches deep and 19 inches projection. These buckets are fastened to a shaft, the ends of which are equipped with steel-bushed rollers. These rollers travel on a 30-lb. rail made fast to runway timbers. Each bucket is provided with a double link bar on each side ,made of ½ x 3 x 18-in. bars. The rollers are lubricated by compression grease cups connected to the end of the shaft. The buckets are made of ¼-in. steel pressed from a single sheet and reinforced with a ¾ x 2-in. bar strap fastened on the lip of the bucket, for taking the wear. The speed of the elevator is 95 feet per minute. The elevator head is equipped with compound back gears of large dimensions, operated from the line shaft that drives the screen.

Rolls.—The 60 x 30-in. heavy-duty roll is one of the largest smooth-faced rolls yet built in this country, considering the width of face and weight of machine. This roll has an overall dimension of 16 feet. The shafts are 16 inches in the hub and 14 inches in the bearings, each bearing having a length of 46 inches. The frame is cast in one piece, and weighs 30 tons. The drive pulleys are of cast steel, the main pulley being 96 inches diameter by 24 in. face, while the smaller pulley, on the movable roll, is 60 in. diameter by 14 in. face. This roll is operated at 50 r.p.m. or a peripheral speed of 785 feet a minute.

The rolls are equipped with a lateral adjusting device that prevents corrugating or channeling of the tires. The bearing is double the size required for the work being done and is dust-proof and efficiently lubricated. Its capacity is 300 cubic yards per hour, crushing from 4 in. down to 2 in. It is shown in Fig. 3. All chutes in the plant are heavily lined with steel.

Power.—The large crusher is operated by a 300-h.p., 3-bearing, form "M," mill-type induction motor, of the slip-ring type, and has about 2½ times full-torque load in starting. It operates at 560 r.p.m. This motor is equipped with a self-starting regulator, 33 x 27-in. pulley, and drives a jack shaft with a 26-in. triple-leather, endless belt, the pulley on this shaft being 94 x 27 in. This jack shaft is equipped with an individual friction cut-off clutch which permits the starting of the crusher after the motor is in motion. On this jack shaft is a 60-in. heavy sheave wheel, with 15 grooves for 1½-in. rope, by which the large crusher is operated, the driving sheave on the crusher shaft being 11 feet in diameter. The rope drive has a tension carriage and idler sheave.

On account of the intermittent load, due to the irregularity in the size of product fed into a crusher of this size, it becomes necessary to have great flexibility in the transmission, although when operating at full speed, with the enormous momentum of the two 12-ft. 15-ton fly-wheels revolving at a peripheral speed of 3,400 feet a minute, there can be little variation.

The motor for operating the 3 x 6-ft. crusher is 150 h.p., 560 r.p.m., and of the same type as the 300-h.p. motor. It is equipped with self-starting regulator, and a pulley 29 x 21 inches is belted to the crusher, with a 20-inch extra double-leather, endless belt.

The crushing roll is operated by a 100-h.p., 560-r.p.m. motor, of the same type as the others, and is equipped with a pulley 21 x 17 in. which drives a 108 x 17-in. pulley on a jack shaft, this shaft operating the rolls and also the countershaft that drives the roll feeder.

The elevator and screen are driven by a separate 50-h.p., type "K," squirrel-cage induction motor, equipped with self-starting regulator, and operates at a speed of 850 r.p.m.

There are two conveyors in the plant; one, the short, or cross conveyor, is operated by an individual 5-h.p., type "K" motor, direct-connected through gearing and counter-shaft; the other, or main conveyor, is driven by a 15-h.p. type "K" motor, direct-connected through gearing and operating at 850 r.p.m., provided with an individual automatic starter.

The current is alternating, 3-phase, 60-cycle, 440-volt, stepped down from 2,200 volts. It is transmitted from New York City.

Cableways.—Cableways will be used less than generally the case in such an operation, although two cableways of 1,860 feet span each, of 2½-inch locked-bar type, are being installed. Building materials will be delivered directly to the derricks by trains.

The work is being done under the supervision of the engineers of the Board of Water Supply of the City of New York. The contractor for the construction of the Kensico dam, for whom the rock-crushing plant is being installed, is H. S. Kerbaugh, Inc., of New York and Philadelphia. Mr. Beverley R. Value is chief engineer of that company, Mr. B. C. Collier, resident engineer, and Mr. George H. Angell, superintendent.

The crushing plant was designed and is being installed complete by the Traylor Engineering & Manufacturing Company, of New York, with works at Allentown, Pa.

Method of Felling High Chimneys

An interesting method of felling lofty chimneys is practised in England. The originator of this method, a Manchester man, is credited with having felled, without accident, more than one hundred chimneys which for one reason or another had become useless. Some of these were from 200 to 250 feet in height. The method consists in removing the stones or brick near the foot of the chimney and substituting an underpinning of wood, which is afterwards set on fire. About two-thirds of the area of the base is removed up to a height of five or six feet, so that most of the weight rests upon the underpinning. Experience has shown that when the work is properly done the chimney leans slightly toward the side where the underpinning is inserted, and when a slight crack appears in the masonry on the opposite side the time has come for the fire to be applied. As the chimney falls it partially telescopes in consequence of the shock produced by dropping into the void left by the burned timbers.

Grand Trunk Pacific Dock, Vancouver, B. C.

This dock is situated on Burrard Inlet, opposite the foot of Main street,—one of the principal streets in the city of Vancouver and destined to be the centre of the wholesale and business district.

The dock is about 870 feet long from shore line to outer end, and for 350 feet from the shore is 280 feet wide. From this part a pier 100 feet wide extends to the outer harbor line, giving a slip on the west side 515 feet long and 60 feet wide, and on the east side a slip 550 feet long and a width of 123 feet.

With the exception of the shore end, where the dock will be filled in, creosoted bearing piles are used throughout. The specifications for these called for piles to be first growth fir, a minimum of 9 inches in diameter at the top, and 14 inches at the butts, penetration of oil to be 1 inch to 1¾ inches under a twelve-pound treatment.

The bents were driven ten feet apart and piles spaced along the bents at distances varying from 10 feet centres at inner to 3 ft. 6 in. centres at outer end, depending on the depth of the water, with special provision for piles to carry the spur track.

The dock is strongly braced with brace piles at every bent, driven on a batter, and in addition is braced both laterally and longitudinally with 6 in. x

12 in. creosoted bracing. A system of diagonal bracing between the caps is also used.

Caps are 12 in. x 12 in. with joists 4 in. x 12 in., spaced 30 inches apart, and 12 in. x 12 in. stringers under warehouse posts and at sides. Decking is 4 in. x 12 in. with a strip of double decking down the centre 20 feet wide for use of teams. Caps are drift bolted to every pile with ¾ in. x 22 in. drifts, stringers and decking fastened with 8 in. spikes. All lumber used was of merchantable grade.

On the east side of the dock is a spur track from the Canadian Pacific Railway, arranged so that the car floor will be on a level with the warehouse floor.

Grand Trunk Pacific Wharves and Dock, Vancouver, B. C.

Slips.—The dock is equipped with six adjustable slips, three on each side, worked by a worm, four of which are 11 feet wide and two 8 feet wide, railroad tracks on east side being carried over slips by means of bascule bridges. At each slip is located a power plug for use of electric conveyors.

Fender Piles.—These piles of tight bark fir were driven two at every bent, fastened to 12 in. x 12 in. stringers by means of ¾ in. bolts. They were spaced 5 feet apart at sea end, and clusters of seven were driven at outer corners and lashed with ¾ in. steel cable to act as dolphins.

Warehouse.—The pier is covered by a galvanized iron warehouse, 500 feet long by 70 feet wide.

The roof of the main warehouse is supported by trusses, spanning 70 feet on 10 in. x 12 in. posts, spaced 20 feet apart, with 2 in. x 1 in. purlins, and cross braced between trusses to resist wind pressure. Provision was also made, in designing the trusses, to allow for a travelling crane of 5-ton capacity to be installed on the east side.

On the ground floor in front are located the baggage room, dock agent's office and shore stewards' office and store rooms. On the second floor in front are located the general offices of the steamship company, waiting room and ticket office.

A feature of this wharf is the covered overhead walk, electrically lighted, which extends from Powell street over the C. P. R. tracks, approach to pier, and then over the warehouse on the west side to the passenger landing stages. These landing stages are reached by easily inclined approaches from the overhead walk, and carried on pontoons designed to be always at practically the same level as the boat's deck. In this way passengers are kept entirely clear of rail or vehicular traffic.

Oil Tanks.—Space has also been allowed for fuel oil tanks and pump house which are now in process of erection. These consist of one storage tank, 76 feet in diameter, and 40 feet high, with a capacity of 32,000 barrels, and one measuring tank, 16 feet in diameter and 24 feet high, of 1,000 barrel capacity.

Shops.—On the west side of approach to pier, it is the intention to proceed immediately with the construction of carpenter and machine shops, 34 feet by 140 feet.

Tests of concrete slabs 20 in. square and 2½ in. thick are described in a paper by Messrs. S. M. Dixon and P. W. Villiers, recently published by the Institution of Civil Engineers. These showed for plain concrete that, if the strength of the slab supported on two edges and subjected to a concentrated load is taken as 1, then the strength when similarly supported and carrying a uniform load equals 2. When the slab is supported on four edges and carries a concentrated load the strength equals 2, and when supported on four edges and carrying a uniform load the strength equals 4. These rules only apply when the slab is evenly bedded—that is, when, as in practice, it is made in one piece with the cross girders.

Applications are invited up to April 1st for the post of City Engineer of Belleville. The position includes the duties of manager of waterworks and city architect. Applicants are asked to give particulars of qualifications and state salary required. Communications should be addressed to Ald. A. Robinson, Chairman Public Works.

Graphical Calculation of Concrete Reinforcement

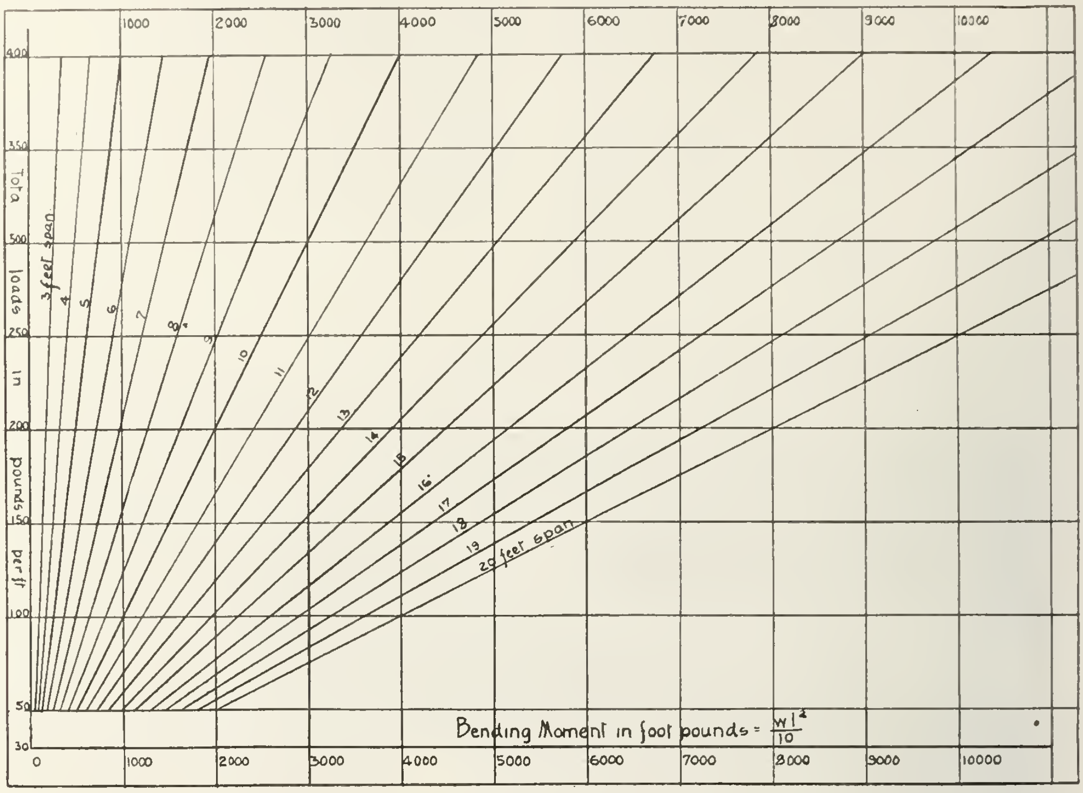

Fig. 1

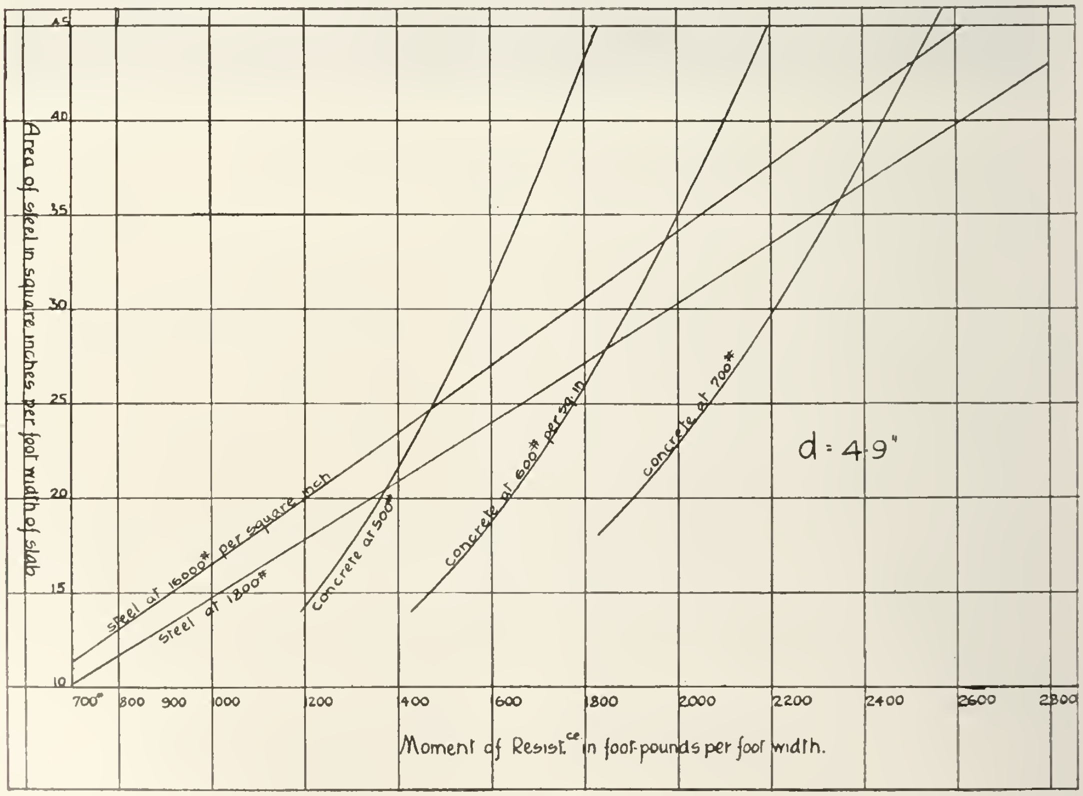

Fig. 2

Graphical Calculation of Concrete Reinforcement

Contributed by Malcolm R. Meldrum

THE constant repetition of similar calculations is very wearisome. The tendency is to produce a species of mental numbness which results in a plentiful crop of annoying and expensive inaccuracies. The figuring of the proportions of reinforced concrete beams and slabs falls within this category. It is practically impossible to make a list of all the various combinations of beam depth and width, steel ratio, concrete mix, etc., and the lists which are sometimes used show such big gaps that the "nearest" figures are often lamentably far from the ideal proportions for the structure.

It is well to be on the safe side, but when all proper precautions have been taken, any excess of material is just an added stress on the structure, and a consequent weakness in the design, to say nothing of the useless expenditure involved.

The only method which will obviate the necessity for repeated figuring and, at the same time, supply for immediate reference all the ordinary combinations of the variables, is the Graphical Method. The plotting of graphs is no new process, and it is surprising that so few engineers avail themselves of the convenience and accuracy which characterizes its use.

The writer has prepared for his own practice a series of diagrams covering all the ordinary calculations in concrete reinforcement, of which the accompanying illustrations will serve as examples. The figuring of bending moment on a slab would appear to be absolutely simple, but it consists of four different operations, and, therefore, permits the possibility of four separate errors. Fig. 1, which represents the formula $M = \frac{WL}{10}$ in diagrammatic form, enables one to read off the result with a minimum of effort and a maximum of accuracy and speed.

Fig. 2 develops the plan to an even more useful degree. Here is shown the progressive increase in strength of a 6-in. concrete slab by the insertion of varying quantities, or "areas" of reinforcing steel. Up to a certain point the increase in strength is practically proportionate to the extra amount of steel, but beyond this point the concrete itself is the determining factor. This "critical point," which depends, of course, on the unit strength of the concrete, is very clearly indicated on the diagram for three ordinarily assumed values of **fc**. Intermediate values can be very readily and accurately located by dividers, or merely by the eye.

As this "critical point" represents the most economical combination of steel and concrete—the point where both materials are stressed to their maximum safe stress—exact determination is obviously a matter of prime importance.

For the sake of those readers unfamiliar with graphs, we might here give an illustration of the use of these two diagrams. A reinforced concrete floor is to carry an added load of one hundred and twenty-five pounds per square foot, giving a total load of two hundred pounds per square foot. In Fig. 1 follow the horizontal line from 200 to the sloping line marked 10 ft. span. From the point of intersection follow the vertical line downwards to the line of bending moments, and read off 2,000 foot pounds.

The internal moment of resistance must equal the external bending moment, for equilibrium. Turning to Fig. 2, find the moment of resistance on the base line, follow the vertical line thence to its intersection with the "steel" line. Notice now the position of the "concrete" lines. Assuming that the safe compressive value of concrete at the outermost fibre is to be taken at 600 per square inch, follow up the vertical until it cuts the 600 line. Then run across horizontally to the left side of the diagram and note the "steel area"—.35 square inches per foot width of slab.

Similar graphs have been prepared for rectangular beams and for I-Beams, and they are capable of saving an enormous amount of time. We hear much of "motion study" in our machine shops and factories, but mental operations are even more expensive than the manual ones, and an effort to obtain economical and efficient results in figuring will sometimes achieve surprising success.

Notable Building at Vancouver, B.C.

Within a few months the city of Vancouver will contain the third largest jewellery store in the world. It will be erected on the corner of Granville and Georgia streets on the site which was occupied for many years by the Strathcona and Durham blocks. The proprietors will be Messrs. Henry Birks & Sons, Limited, of Montreal, Winnipeg and Vancouver. It is estimated that the structure will cost $450,000.

The building will face the new C. P. R. hotel, the "Fort Garry." It will be a ten-storey, fireproof structure, with a frontage of 100 feet and a depth of 120 feet. The foundation will be of concrete and the superstructure of concrete and terra cotta on steel frame,

Proposed New Building for H. Birks & Sons, Vancouver

The firm's store and show rooms will be on the ground floor and will be fitted up in magnificent style with marble from the Missisquoi Company's quarries. The first floor will be for the mail order department and will also provide space for factory purposes. The rest of the building will be devoted to office suites.

The work of demolishing the buildings now on the site will be commenced shortly. The plans are nearly completed and tenders for the new building will be called within a month or so.

Variation in the Levels of the Great Lakes*

The Great Lakes, comprising Lakes Superior, Michigan, Huron, Erie and Ontario (Lake Huron includes the Georgian Bay), lying in and between the United States and Canada, are immense reservoirs or ponds situated on different levels as follows: Lake Superior, 601 feet; Lake Michigan, 580 feet; Lake Huron, 580 feet; Lake Erie, 571 feet; Lake Ontario, 245 feet above mean sea level at New York.

Lake Superior, the largest of the lakes, is 383 miles in length and, approximately, 100 miles in width. The maximum recorded depth is 1012 feet. Its outlet is at the St. Mary's River and it is connected with Lake Huron by this river and other natural and artificial channels for a distance of, approximtaely, 67 miles.

Lake Michigan is 321 miles long and its breadth is 118 miles; it has a maximum depth of 870 feet.

Lake Huron is 220 miles long, 101 miles wide, and has a measured maximum depth of 775 feet.

The Straits of Mackinac connect Lakes Michigan and Huron, and Lake Huron is connected to Lake Erie by the River St. Clair, Lake St. Clair and the Detroit River.

Lake Erie is 240 miles long by 57 miles at its greatest width, and its greatest depth, recorded, is 232 feet, but the average depth is only 100 feet. Its outlet is the Niagara River which connects it with Lake Ontario.

Lake Ontario is 190 miles long, 57 miles wide and 730 feet deep. Its outlet is the St. Lawrence River.

Lake Superior has an area of 32,000 square miles; Lake Michigan, 22,336; Lake Huron, 22,978; Lake St. Clair, 503; Lake Erie, 9,968, and Lake Ontario, 7,243 square miles.

Lake Superior drains an area of 44,074 square miles; Lake Michigan, 43,483; Lake Huron, 49,030; Lake Erie, 24,605, and Lake Ontario, 25,737 square miles.

What I wish, particularly, to call the attention of the Board to, is the fact that these bodies of water are subject to great oscillations and variation in levels, with the possible exception of Lake Superior, which remains practically normal, owing to the wise precaution made by the Board of American Engineers at the time of the construction of the power canals at Sault Ste. Marie. They demanded that the power company should build a compensating dam at the head of the rapids that would a little more than compensate for the extra flow of 9,000 cubic feet per second from Lake Superior. This dam has had the desired effect, and assisted by the piers of the International bridge, the permanent level of Lake Superior has not suffered.

Lakes Huron and Michigan, and the Georgian Bay

We come now to Lakes Huron, Michigan and Georgian Bay. The surface in these three bodies of water is 3.2 feet lower than it was in 1886. The cause of this serious recession is, in my opinion, easily accounted for. It is on account of the removal of the crest of the natural dam between Lakes Huron and Erie. The original canal through the St. Clair Flats was ten feet deep and fifty feet wide, making a cross section of 500 feet. The present canal has a width of 250 feet and a depth of 22 feet, making a difference between the old and new canals of 5,000 feet. Then again all the channels have been enlarged between Lakes Erie and Huron. The Limekiln Crossing, where the channel originally had a depth of 12 feet of water, has been superseded by the construction, by the American Government, of a new channel on the Canadian side, having a width of 600 feet; the depth has been increased 10 feet, augmenting the flow here by 6,000 feet. This plan of increasing the channels between Lakes Huron and Erie has been carried on regardless of the effect on the levels of Lakes Huron and Michigan. The Chicago Drainage Canal, it is admitted, is responsible for several inches of the lowering of the levels of these two lakes and the Georgian Bay.

The only way to overcome this serious proposition is to construct compensating structures at, or as near as possible, the outlet of Lake Huron. The structures should be adjustable, in order that the water may be impounded during the winter months when not required for navigation purposes, and the sluice gates should be opened at the proper time to fill the lower reaches and thus provide for navigation. The effect in the way of loss to the various lines of transportation, and also to the general public, caused by the lowering of the lake levels, is impossible to estimate. However, take the following example: say a vessel, capable of carrying 8,000 tons can load to 6,000 tons only on account of the low stage of water, and say she makes thirty trips during the season. This would mean a loss to this vessel alone of 60,000 tons in freight, and if the line had, say, thirty boats of the same capacity, it would mean a loss of 1,800,000 tons, which would indeed be a serious loss to the company operating the boats.

On the other hand, the shippers and country at large suffer as the freight is required. The grain from the West must not be tied up. The West requires coal and the smelters in the East must have the ore. Then again, the country, through the government, has to foot the expense of millions for dredging in order to deepen the harbors and channels which have been made shallow for these large freighters.

Last year there passed through the canals at Sault Ste. Marie 20,899 vessels carrying a total tonnage of 49,856,123 tons,—nearly five times as much as through the Suez Canal, which is open to the commerce of the world. Of the above, 12,927 vessels passed through the canals on the American side carrying 26.506.86 tons, and 7,972 on the Canadian side carrying 23,349,137 tons.

Vessels Unable to Load to Full Capacity

I am informed by the managers of a number of the large steamboat lines that notwithstanding the immense expenditure that has been made by the American and Canadian governments on improvements to the channels between Lakes Superior and Huron, and between Lakes Huron and Erie, that the larger vessels are unable to load to their full capacity by two to three thousand tons.

This is an international question and the means of relief will, necessarily, have to be considered by the governments of Canada and the United States, I am endeavoring to get this Harbor Board interested and impressed with the necessity of having something done in the immediate future, in the way of regulating the levels of all the Great Lakes.

The International Waterways Commission have recommended the construction of a dam near the outlet of Lake Erie on the Niagara River in order that the level of that lake may be maintained at 574 feet, raising it one foot. It is claimed that this will raise the level of Lake Huron slightly.

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*Report of Mr. J. G. Sing, C. E., District Engineer Public Works Department, to Toronto Harbor Commissioners.

The following is the average and extreme discharge of the outlets for the period 1880 to 1907, as given by the International Waterways Commission:

	Cubic feet per second			
	St. Mary's	Detroit	Niagara	St. Law. at its head
Average discharge for entire period	82,000	204,000	212,000	254,000
Greatest excess average for any one month	46,700 Sep., 1869 57%	71,200 July, 1883 35%	45,600 June, 1873 21%	96,800 May, 1862 38%
Greatest excess average for any one year	19,100 1876 23%	30,200 1885 15%	26,500 1876 12%	49,000 1862 19%
Greatest deficiency average for any one month . .	33,800 Feb., 1893 41%	98,900 Feb., 1874 48%	43,500 Mar., 1896 20%	102,200 Feb., 1902 40%
Greatest deficiency average for any one year	16,900 1879 21%	30,600 1896 15%	31,800 1895 15%	62,800 1895 25%

In dealing finally with a large and important engineering problem, such as this is, it would be necessary that most careful and comprehensive surveys and examinations should be made and the regulation of the levels of all the lakes taken into consideration in order that one might not be benefited at the expense of another.

What I hope your Honorable Board may do is to take this matter into your serious consideration and lay it before the Toronto Board of Trade, the Associated Boards of Trade of Ontario, and also, before the Honorable the Minister of Public Works of Canada, when it can, if he sees fit, be laid before the Government of Canada, together with the question of appointing a Joint Special Commission composed of expert engineers from Canada and the United States—men of experience and ability who have studied this great question thoroughly.

Concrete Water Mains

The use of water pipes made of concrete for municipal water supplies is discussed by M. E. Bazin in a recent issue of "Nouvelles Annales de la Construction." He notes their adaptability for carrying waters either neutral or low in acid or alkali, and under low pressures. Such pipes do not affect the taste of the water passing through them and, it is stated, afford little if any opportunity for the development of vegetable organism on the inside surface. By the use of waterproofing compounds a high degree of impermeability, it is stated, may be obtained, and in the cities of Cologne and Stettin, which require an absolute impermeability under a pressure of about 9 lb. per square inch, or an equivalent head of about 20 ft., concrete pipes are said to give entire satisfaction. In the observed cases of leakage or fracture of these pipes it was found that failure resulted either from improper plugging of the joints or from such contributing conditions as would have caused a similar failure in cast iron or clay pipes.

The author states that special care is necessary in the selection of the materials used in the manufacture of these pipes, particularly in the choice of the sand. As a result of tests conducted by the Corps des Ponts et Chaussees, the author believes that any high-grade Portland or slag cement may be used. The latter is said to be of special value on account of its behavior under water or in wet ground. Under such conditions it is said to acquire a strength greater than that of Portland in a short period of time. The chemical and mineralogical composition of the sand should be investigated before a selection is made. Sand that is friable or contains soluble substances such as gypsum or salts of magnesium is not suitable. For these reasons argillaceous and calcareous sands are to be avoided, thus practically limiting the choice to siliceous sands. Of these, river sand is preferable to sea sand. If the latter is selected it should be thoroughly washed before using it in the concrete. The author emphasizes the necessity of using the same precautions in the selection of the gravel and suggests the need of a careful study of proportions to secure uniformity..

Deep Reinforced Concrete Beams

Deep reinforced concrete beams for long spans are a feature of the new Western District Post Office of London, Eng. This building has a 200 ft. frontage and is 160 ft. deep, with three floors, a basement and a flat roof. As only four large columns were allowed in the center of this floor space for the support of the floors, it was necessary to employ spans varying from 39 to 45 ft., with resulting column loads as high as 200 tons. The principal floorbeams for the three floors are suspended by strong steel stirrups from reinforced concrete wall beams, the latter forming the internal walls surrounding the inner court, above the various floor levels. These beams are 6 ft. deep and have spans of about 39 ft. By their means it was possible to secure the necessary window height required by the Office of Works. The extensive beams which carry the other end of the suspended beams have spans of about 45 ft. and are over 12 ft. in height. In some cases their section below the neutral axis was intersected by a series of large windows. The suspended beams with spans of 45 ft. are 14 in. wide by 60 in. deep, while those with spans of 37 ft. are 10 x 40 in. According to a paper by Mr. G. C. Workman before the Concrete Institute, round bars of mild steel were used and different members were either rigidly connected or hooked over one another. Floor tests of 150 lb. per square foot gave deflections less than 1/1500 of the span.

When concrete has been frost-bitten before final setting, it is very apt to develop defects that call for its removal or repair, says The Concrete World. The following method of repairing such concrete has proved successful: Chip off with a pick or other suitable tool the concrete which has been affected by frost, and then thoroughly wash the exposed surface with water, using a stiff scrubbing brush, until entirely clean. A 1:3 solution of muriatic acid is then applied with a brush, and the surface is again washed. As soon as possible after this is done, a very wet mixture of new concrete is applied. Where the old surface has been thoroughly cleaned, and the new concrete kept damp for a week, it bonds nicely with the old surface, making it appear as solid as if the entire mass had been placed at the same time.

The Good Roads Movement in Ontario

Remarkable Progress Evidenced at Toronto Convention last week—Provincial and Federal Governments ready to Co-operate—Noteworthy Addresses

THE Province of Ontario was well represented at the tenth annual convention of the Ontario Good Roads Association, held last week, February 26-28, in Toronto. Some one hundred and fifty members were in attendance on the first day, but this number afterwards swelled to more than two hundred. The convention was the most representative and successful yet held by the Association.

At the opening session on the morning of February 26, following some routine association work, the president, Major T. L. Kennedy, of Dixie, delivered an interesting address in which he outlined a scheme for a provincial system of main highways from county town to county town throughout the province of Ontario. Such a system would comprise nearly 2,500 miles, he said, and every county in the province would bear its share. The roads would be essentially farmers' roads, and, as such, the scheme would receive the enthusiastic support of the farming community.

Dominion Government Will Give Liberal Help

Mr. Andrew Broder, M.P., admitted that, though Canada had spent about $500,000,000 for its railways up to the present, it had not done an equal share in creating good highways. Though he was not prepared to say what form the assistance would take, he declared he knew that very liberal help would be given. This would be done, as the prime necessity of the present age was to keep the people on the farms, and good roads were the most potent means of doing it.

A valuable paper on County Road Construction was given by Mr. W. A. McLean, Provincial Engineer of Highways. A copious extract of this paper will be found on another page.

Mr. Herbert J. Bowman, C.E., of Berlin, Ont., took for his subject "Federal Aid for Good Roads." The question of raising money for road work was an all-important one, said Mr. Bowman, and in the ordinary way had to be obtained by taxation. The speaker continued:

"The tax should be borne by the different sections of the community, as far as possible according to the benefit received by each. Good roads throughout the country benefit both the producer on the land and the consumer in the city, so a portion of the cost should be levied upon the urban as well as upon the rural municipalities. Moreover, the country highways are used more and more by motor cars from the towns and cities, and more expensive roads are required for this traffic. For these reasons urban municipalities should contribute towards the construction and maintenance of the highways in the adjoining rural municipalities. In the province of Ontario, however, as now organized and administered, there is no tax on city municipalities for country roads. A remedy for this resulting injustice is supplied by federal aid for good roads. Through it, all classes will contribute towards the building of the King's highway.

"The splendid roads of England, France, Germany and other European countries are, as a rule, built and maintained by the national governments, under expert supervision. In the United States the Federal Government has for years maintained the Office of Public Roads in connection with the Department of Agriculture. Through this office, expert engineers are supplied free of charge and object lesson roads are built in those counties assuming County Roads systems. Large sums are voted by different states for building good roads, and the cities, moreover, not being separated from the counties in which they lie, contribute towards the county rates, so that there the farmers do not carry all the burden of maintaining the highways. The city of Buffalo, for instance, has already contributed towards the building of roads in Erie county over a million dollars, and pays besides, its share of the $50,000,000 voted a few years ago by the State of New York for Good Roads. For these reasons contributions from the Federal treasury are less necessary in the United States, and yet several bills are now before Congress for this purpose. In Canada, however, no better way can be found to defray the cost of building and maintaining roads than by annual appropriations from the surplus revenue of the Dominion."

After dealing at some length with the subject of grants to provinces, and suggesting that upon the basis of one dollar a head of population it would be reasonable to expect the sum of two million per annum as Ontario's share of federal aid for good roads, Mr. Bowman outlined what he considered a fair division of the cost of county roads, namely, one-half payable by the Dominion, one-quarter by the province and one-quarter by the county. "With forty counties in old Ontario," said Mr. Bowman, "this would mean an annual expenditure in the average county of $50,000 per year. One-quarter of this ($12,500) would be added to the county rates, or if the County Council found it necessary, this amount could be raised by debentures guaranteed by the province and sold direct to investors in the mother country instead of being peddled around to our local people at a comparatively high rate of interest.

Government Commission Suggested

"Proper supervision of this great national undertaking is absolutely necessary," concluded Mr. Bowman. "Let the Dominion Government establish a Highway Commission with expert engineers to advise the province how to proceed and to inform Parliament of the results obtained.

"Let our Ontario Government establish a Highway Commission or a department with a minister at the head of it. Then employ engineers to assist the countries in building roads adapted to their needs. This will be a simple matter in some counties, but in others it will call for the most careful consideration."

"No Better Way of Spending Public Money"

On the afternoon of the first day an official welcome was given to the delegates by His Worship Mayor Geary, who expressed himself as being heartily in sympathy with the good roads movement. Mr. Geary pointed to the fact that Toronto had awakened to the extent of deciding to spend $300,000 on the roads leading to the city. He stated that he knew of no better way in which public money could be spent than on good roads. The government could not find a more popular or deserving cause.

One of the features of the Tuesday session was an address by the Hon. Dr. Reaume, Minister of Public Works, who advocated a stricter system of inspection, a more scientific construction of roads, and more adequate training of road builders and engineers. The Provincial Government, he said, would be glad to arrange a series of lectures for University students and others. In Ontario, at any rate, the government were willing and anxious to make the good roads movement a public cause. They were anxious to bring about concerted action on the part of all interested in the work. Dr. Reaume's remark about the training of road experts was in reply to a question from Mr. L. A. Hamilton, of Lorne Park. Mr. Trethewey, of Toronto, who followed Dr. Reaume, considered that the most practical way to help the good roads movement was to appoint a commission in which each government would have two and each county two representatives. Among those who took part in the discussion at this session was Hon. Paul D. Sargent, Assistant Director of the United States Offices of Public Roads, who afterwards gave an interesting talk on "State Highway Systems."

Mr. C. Collins and Mr. J. F. Vance advocated the building of a provincial turnpike from the boundary of Quebec to Windsor, with trunk lines running out into every county it passed through.

That good roads and the highest forms of agriculture go hand in hand was the statement of Mr. L. A. Hamilton, of Lorne Park. Approximately $5,000,000 was being spent annually in the British Isles for highway improvement and maintenance. Much of this was derived from a tax on motor cars and amounted to about fifty cents per horse-power per year. Thus the dues ran from fifteen dollars for a small car to two hundred dollars for one of sixty horse-power. The funds derived in this way were applied directly to the roads, and lightened the burden on the farmer.

Deputation to Provincial Government

Mr. Hamilton thought the first place in road-making was held by France. In that country a special college was devoted to the teaching of the principles. At present from $6,000,000 to $7,000,000 was laid out there annually. The country now had 340,000 miles of magnificent roads. He had cycled on 2,000 roads in France which were as smooth as asphalt. The result, he believed, was that France occupied the. premier position in the agriculture of the world.

Mr. James A. Bell, consulting engineer, St. Thomas, Ont., read an informative paper on Bridge Construction, which we hope to reproduce in a later issue.

On Wednesday, February 28, some 200 members of the Association waited upon Sir James Whitney, Hon. Dr. Reaume, Hon. W. H. Hearst, and Hon. James Duff, at the Parliament Buildings.

Mr. S. L. Squire, of Waterford, asked that the provincial grant to county roads be more liberal than in the past. He felt that the province should superintend and supervise the county roads work. A Government committee could select the roads to be improved and decide upon the methods of construction, thus making for a continuity of roads from county to county until a uniform system was established throughout the province. Other speakers were Mr. E. M. Young, of Picton, and Mr. L. A. Hambly, of Lorne Park. They were introduced to the Ministers by A. M. Rankin, M.P. for Frontenac.

In reply, Hon. Dr. Reaume said the government was considering making the provincial aid more liberal this year. The question of maintaining the roads appealed to him as a very important step in the right direction. Experience showed that it was important that the government should pay some attention to this.

Speaking of the $5,000,000 appropriation proposed for the development of New Ontario, Hon. W. H. Hearst said there was no doubt that it would be necessary to devote a considerable proportion of it towards the building of good roads.

Sir James Whitney deemed it a good sign when such great interest was manifested from all parts of the province, and expressed cordial sympathy with the work the Association was doing. The government would give attention to the suggestions embodied in the resolutions. All the details of the great work which the government was considering still remained to be worked out, and, therefore, these suggestions would be gladly received.

At the election of officers Major Kennedy, of Peel County, was re-elected president; Col. Farewell, of Whitby, hon. secretary; and Mr. George Henry, of Oriole, secretary-treasurer.

Road Superintendents Convene at Victoria, B.C.

The first convention of road superintendents in the province of British Columbia was held last week at Victoria, B. C. The chairman of the meeting was Mr. W. W. Foster, Deputy Minister of Public Works. The feature of the sessions, perhaps, was an interesting address by the Hon. Thos. Taylor, Minister of Public Works, who aroused the greatest enthusiasm by the announcement that his department intended to ask the Legislature to appropriate the sum of $5,000,000 for road and trail construction. Another speaker was Mr. R. H. Thomson, chief engineer of the Seattle Port Commission, who gave an interesting address touching upon the history and development of road work, illustrated by lantern pictures. Mr. Thomson emphasized the importance of maintenance, the secret of which ,he said, was eternal vigilance. Many a good man, said Mr. Thomson, had lost his religion upon a bad road.

Premier McBride spoke enthusiastically about good roads work and paid a tribute to Chief Engineer Griffith and Chief Railway Engineer Gamble, the trail blazers of the past in the Cariboo, the hinterland, and the Island. The Cariboo wagon road was a remarkable tribute to the past efforts of road builders in this province, and formed a magnificent precedent which should never be forgotten. He was glad to see so many distinguished road builders present as Messrs. Mohun, John Sprott and R. H. Bonson, whose father, as one of the Royal Engineers, had left his mark in the lower Fraser Valley and the Cariboo as a road builder. He also expressed his pleasure at seeing James Cummings, from the far-off Cariboo, among them.

No more graphic illustration of the growth of the west of Canada could be desired than the recent announcement of the three big railway systems as to their proposed works for the present year. The aggregate expenditure in Canada will probably come to over one hundred million dollars, counting in the work on the Hudson Bay Railroad and the National Transcontinental.

Practical Suggestions upon Road Work

Various Types of Main Roads Compared— Notes on Drainage, Grading and Surfacing Methods of Construction Materials

AT the annual convention of the Ontario Good Roads Association held last week, the Provincial Engineer of Highways for Ontario, Mr. W. A. McLean, read a valuable paper, entitled, "County Road Construction in Ontario," the greater portion of which is reproduced below. In his introductory remarks Mr. McLean dealt chiefly with the subjects of administration and organization. It was important to know how to build good roads, Mr. McLean said, but at present the great object was to organize so as to get the work done. The speaker recommended that the county council should centralize the responsibility of road work in one capable road superintendent. In Ontario, twenty counties had road building systems. Their expenditure up to the end of 1910 was $2,681,436.

The balance of Mr. McLean's valuable paper is of an eminently practical and helpful nature and contains the expression of noteworthy principles in good roads work:

Main Roads

Broken stone roads of the best class have been reduced to a few well-defined types, through more than a century of experience in England, France, Germany and on this continent. The true macadam road has a well-drained and crowned earth sub-grade, over which is spread a uniform coating of broken stone of about two and one-half inches in greatest dimension. The Telford road has a foundation of flat quarry stones, placed by hand, on edge, the angular points being chipped off by hammer and wedged into the interstices; and over all is spread a coating of fine broken stone, in thickness about one-third of the total depth of the stone surface. The earth sub-grade is flat, and larger stones are used at the center of the road, with smaller at the sides, to give the desired camber. The roads built by Tresaguet in France were substantially the same as the Telford road, and are usually included with it. In the French type, the sub-grade was cambered, and the foundation stones of uniform depth. A distinct type of foundation is that developed in Massachusetts, in which there is a slightly V-shaped sub-grade with a filling of cobble or field stone, a method which is claimed to give, more effectively than other types, the desirable under-drainage.

Experience has shown the superiority of roads with a foundation, such as the Telford type, in reducing the cost of maintenance under heavy traffic. Settlement is more uniform, and defective drainage is less destructive. If the natural sub-soil is strongly supporting, such as a dry, well-cemented gravel, the foundation may be omitted with saving of cost. Whether the Telford or Massachusetts type of foundation be followed, the writer believes that local material suitable for either should largely govern.

County roads in Canada cannot, as a rule, follow closely English, French, German, or other standards, but must be built with a view to the particular needs of this continent, and of the locality. The need in Ontario is a long mileage, to be built as rapidly as possible, through districts where population is comparatively sparse, where there may be little or no roadmaking material, and the available expenditure necessarily restricted by these and other conditions.

European engineers would undoubtedly, if it were possible to reconstruct many of their roads, lay them with foundations, but the cost is prohibitive. No more is it practicable on this continent to build any but the most heavily-travelled roads with expensive foundations. Instead, it is necessary to depend on good drainage, carefully maintained, to keep the sub-soil dry and strong enough to sustain the road surface.

Drainage.—Bridges have to be strong enough for the maximum load, and with waterway enough for the maximum freshet. So roadbeds should have sufficient drainage for the severest test, which in northern countries is a period of thaw in the early spring, lasting usually for two or three weeks. If sub-soil drainage is sufficient for that test, no break-up of the road crust need be feared at other seasons.

Old specifications for roads built in Canada before the period of railway construction, required open drains on each side of the road, with bottom at least two feet below the crown. In many places the drain was deeper; and hills or spouty places were underdrained by trenches filled with field stone. Such roads have stood the test of time, and may be accepted as the standard of drainage required for the north; except that tile under-drains are taking the place of open ditches where they would otherwise be dangerous, unsightly or difficult to maintain. Drains of porous farm tile keep the sub-soil at its dryest and prevent uneven settlement of the road crust into mud, which is as destructive to a road when below the surface as when on the surface. Some counties of Ontario are using tile drains the full length of all their roads. Others use them only on wet and spouty hills; on level land which is exceptionally wet and retentive, or where the open drain would otherwise have to be dangerously deep to give sufficient fall and outlet. In the last case, the tile may carry some surface drainage, receiving it in catch-basins.

Grading and Surfacing.—Closely associated with drainage is the grading of the road. Before a road is surfaced it should be brought to grades that insure permanence. Hills should be cut down, low places filled, and earth work brought to a substantial turnpike. The road surface will need renewal, but the grade, if properly made, will outlast even the bond issue. On roads of a secondary class elaborate surveys are necessary. A good foreman can obtain easy-flowing gradients by grading from point-to-point, but should have an engineer's stakes and profiles in cases of extensive cuts and fills, new locations, tile drains, or doubtful surface drainage.

Roads laid on an earth foundation should be given a higher crown when newly constructed than is desirable for perfect condition. Settlement will assuredly occur, and unless the road is too high to begin with, it will become too flat. A county road as commonly built, which in two or three years has settled to the desirable camber will give the greatest degree of durability, with least expense for maintenance. One inch to the foot from center to gutter or edge of shoulder, for a completed, rolled road, will meet ordinary conditions. With a circular cross-section, the greatest part of the fall is on the earth shoulders.

The cost of a road, unless earth-work and drainage is of an exceptional kind, will depend on the width of broken stone used. Wide, flat roads are desirable, but narrow roads with a good camber, cost less to build, and much less to maintain, unless a highly organized system of maintenance is created. We have, for this class of road, found an earth grade twenty-four feet wide, shoulder to shoulder, to meet most conditions, which may be reduced to eighteen or twenty feet for least traffic. With shoulders six feet wide, the stone is commonly put on from eight to twelve feet wide. The consolidated depth of metal on county roads is based on eight inches for a moderately strong clay or loam sub-soil. This is modified according to the anticipated amount of traffic and quality of stone to resist wear; the maximum concentrated wheel loads, local tire widths, and wheel diameters; bond of road metal and consequent distributing effect of the metal crust, the supporting strength of the subgrade and opportunity for drainage.

Bituminous binders may be justified on heavily-travelled suburban roads of this class, but present practice in Canada tends to oiling as a preservative and dust preventative, owing to the less first cost of water-bound macadam.

Binder.—The durability of a road is largely dependent on the binder, and the cementing qualities of the stone dust, in producing a waterproof surface—if tar or other bituminous binder is not used. We are strongly in favor of the use of stone screenings as opposed to sand, and have very rarely found gravel or sand sufficiently clean, coarse, and sharp to satisfactorily take the place of screenings as a binder. Wherever practicable, stone screenings are to be recommended, particularly the screenings of certain classes of limestone; the superior cementing qualities of which make it a better road metal than its degree of toughness would justify. Limestone screenings are exceedingly useful with water-washed gravel, or with broken granite or trap.

Coursing Stone.—A uniform grade of stone, rather fine, is desirable in finishing the surface of a road, and is necessary where a very hard stone such as trap is employed; but this may be sought at considerably increased cost, and is not always necessary to suitable results. It adds to the cost of a road to spread the stone in several layers. Municipalities using portable crushers will find a rotary screen with two sizes of mesh very satisfactory. This will produce (1) "tailings," or the stone too large to pass through the screen; (2) the middle course, a uniform grade to form the main body of the road, and (3) "screenings" to bond and finish the surface. The tailings should be spread in the bottom of the road, and covered to the required depth with the uniform grade; and this, after rolling, may be lightly coated with screenings and rolled. If a very tough stone, such as trap, the screenings may be such as will pass a one-inch mesh, and a one and one-half inch mesh if limestone, and the uniform grade of stone may be two-inch for trap, and three-inch for limestone, with the screenings removed. Crushing and handling are cheapened by this system, and, for water-bound roads, a smooth surface results.

Local Material.—Trap or other tough rock brought from a distance by rail in preference to the use of soft local material, may be justifiable for surfacing heavily travelled main roads; but it is a safe rule, if applied with discretion, that local material, if it exists, should be used. Much will depend on the teaming required, but for moderate wagon hauls up to two miles, on highways of the second and third classes, the writer has commonly found gravel roads being built for $100 per mile for each foot in width of metal. If local broken stone is used, the cost is, all things equal, about doubled, or $200 to $300 per foot, and if imported by rail, about $300 to $400 per foot. Taking then, a road not requiring much grading and with eight feet of metal and eight inches in consolidated depth, the cost might be stated, for cheap construction, at $900 or $1000 a mile for a gravel road; $1600 to $2400 a mile for a road built of local crushed stone, and $2400 to $3200 per mile if the stone is brought in by rail. These prices are for the cheapest class of road that can be built, and the main roads of the province should have a much heavier type of construction.

Gravel Roads.—Gravel in general is inferior to broken stone as a road material, but if of a reasonable quality, is suitable for roads of the third class—township roads—and for many market roads of the second class, but unless of exceptional quality is deficient for heavy traffic. The rounded pebbles do not take the mechanical clasp that pertains to fragments of broken stone, while the sand which it usually contains is not equal to stone screenings as a binder. It may contain lime or iron, improving its bonding qualities, but as a rule it is not waterproof, and ruts readily in wet weather, especially if it contains sand, clay, or loam in excess.

The best quality of gravel is of varying sized grain up to two inches in greatest dimension, with only sufficient fine material to fill the voids between pebbles. It should be clean and made up largely of a uniform grade of pebbles—qualities rarely found in natural pit gravel. Gravel pits containing a mass of large stones and boulders should be treated as rock, and put through a crusher. Gravel which is not coarse, but which is "dirty," should be screened to remove the excess of sand or clay. A rotary screen may be used, operated by steam power. The gravel can be drawn in wagons to an elevated platform, dumped into a hopper from which it passes through the rotary screen, and from the screen to an elevated bin, from which the screened gravel is again loaded into wagons to be taken to the road. By means of the elevated bins the expense of shoveling into wagons is saved, the time of teams and teamsters is saved, and a well arranged plant will, under favorable circumstances, pay for crushing and screening. This is particularly the case if a pit near the work can be used rather than to team better material a long distance.

Methods.—The methods of construction will largely determine the cost. Machine work is cheaper than manual labor. The cross-section adopted should therefore permit the maximum amount of machine construction. Particularly for the cheaper class of roads, the grading machine, in treating with old locations should do most of the earth work, supplemented with wheeled and drag scrapers. The cheapest and best plan, in our experience, has been to make the earth sub-grade, shoulder to shoulder beneath ditches, almost flat, or with a central rise of about three inches for a twenty-four foot grade. When this is rolled the stone is spread to the desired width in the center, then with the grading machine, earth is drawn from the shoulders to support the stone, thus completing the camber. The stone is rolled dry to level the surface, the screenings are spread, sprinkled, and rolled till consolidated. To grade the road and then excavate a central channel to receive the metal is a more expensive method, and is apt, for roads without a foundation, to place the stone too low for good drainage, producing what may be termed a "water-logged" road. Instead of the camber and turnpike being high enough to allow for settlement, it is apt to be made too low and flat.

Rolling.—As distinguished from earlier road making, modern construction has been largely influenced by machinery, especially grading machines, rock crushers, and road rollers. The smaller municipalities of Canada, commonly use graders and crushers, but the purchase of a steam roller is too often delayed. It is to be pointed out that the cost of a roller is by no means an additional expense, since rolling effects economy in several ways. Coarser stone can be used in a road that is rolled, so that the cost of crushing is reduced. With coarser stone, the road is stronger to resist wear, and is more securely bonded than if first rutted and mixed with mud. Less stone is required in a rolled road, as loose stone is largely forced down into the mud before the surface becomes waterproof, or is knocked to the ditches by traffic. Without rolling, roads demand attention for one or two years, to rake the stone to place from time to time; the earth shoulders have to be restored and leveled where cut up and destroyed by traffic, new material has to be added to fill hollows and ruts. By rolling the sub-grade, the wet or weak spots are developed, which can be drained or filled with earth and again rolled to produce a uniform foundation; thereby reducing the stone which the road would otherwise absorb. Long lines of loose stone left for traffic to consolidate are a most objectionable obstruction to travel, and bring road building into disrepute. On the other hand, a road built with a heavy roller is a complete work, in perfect condition when finished. Rolled roads are a revelation to those who have been accustomed to and who expect only old-time methods and results. For economy, service, and to popularize the work, rolling should be regarded as essential for every class of gravel and stone roads.

Chicago Clay Products Convention

Widespread interest is being taken in the forthcoming Clay Products Exposition which is to be held in the Coliseum, Chicago, March 7-12. The exhibits will be devoted entirely to clay products and already there is every assurance that they will justify a visit from any contractor, engineer, builder or municipal officer interested in keeping abreast of the latest constructional developments.

In the annex, which is to be devoted almost entirely to sanitation, engineers and contractors will find a great source of interest and information. For instance, a space 170 feet long and 70 feet wide will be given over to the latest approved methods of city sanitation. A full size vitrified brick street will be shown and in this street a model sewer of vitrified salt-glazed sewer pipe will be under construction. This sewer will be absolutely watertight—a point that is now being insisted upon by the leading sanitarians. Three or four methods of making these joints tight will be illustrated. A full sized ditch will be shown under construction with steel sheet piling and newest methods of bracing. At the head of the ditch an Austin gasoline driven ditcher will be in operation and other machinery and devices now used by the most careful contractors will be displayed. This model sewer will lead from a porcelain bath room and all the connections and equipment will be shown in full size, such as flush tanks, catch basins and manholes.

Full information may be obtained upon application to Mr. G. F. Tefft, Secretary Clay Products Publicity Bureau, 256 New York Life Building, Kansas City, Mo.

B. C. Government Railway Projects

Further details are to hand concerning Government railway projects for the season in British Columbia. The details, briefly, are these:

Construction of a railway from Vancouver and North Vancouver to Fort George via Howe Sound, Pemberton Meadows and Fraser River by the Pacific Great Eastern Railway. Work to commence ten miles from Vancouver this summer. Fair wages. Supplies to be bought in British Columbia. Government control of rates. Guarantee of bonds to extent of $35,000 per mile. Free grants of right-of-way and townsites.

Construction of a railway over the Hope Mountains in order that there may be an interchange of commerce between the coast and the trade centres of the Boundary, Kootenay and other districts of the interior tapped by the road. This will stop the drain of British Columbia commerce to Spokane and other cities in the state of Washington. Quick connection between the Coast and interior districts will be furnished. In connection with this railway a combination railway and traffic bridge will be built across the Fraser River at Hope. A cash grant of $10,000 per mile to be made towards the construction of this railway. A grant of $200,000 to be made towards the construction of this bridge. Construction of railway to be started this summer, and line and bridge to be finished before July 1, 1915.

Extension of the lines of the Canadian Northern Pacific Railway from Kamloops to Vernon and thence to Lumby, and a line from Vernon to Kelowna, and a line from Vernon to the east arm of Okanagan Lake opposite Okanagan Landing; a line 150 miles in length on Vancouver Island, extending from the 100-mile post on the company's island line to a point at or near Hardy Bay on the east coast of the island. On these extensions the guarantee will be up to $35,000 per mile. Construction to start within six months and finish within three years.

Extension of the Esquimalt & Nanaimo Railway on Vancouver Island from Parksville to Comox. Consent to the leasing of the E. & N. railway lines to the C.P.R., the E. & N. company agreeing to pay the province taxation at the rate of one and one-half cents per acre for its lands, this tax yielding $18,000 per year. The C.P.R. agrees to pay $387,000 to the province to offset the interest charges on the Shuswap & Okanagan Railway.

The province to purchase the unsold portion of the B. C. Southern and Columbia & Western Railway land grants at the rate of 40c. per acre, the total sum involved being approximately $1,000,000.

The C.P.R. to take over, standardize and operate the Kalso & Slocan Railway, now owned by the Great Northern Railway. The province gives a bonus of $100,000 for this purpose.

Altogether the new policy of the Government provides for the construction of approximately 860 miles of railway on the mainland and on Vancouver Island. Of this, 450 miles will be built by Foley, Welch & Stewart, Vancouver to Fort George; 145 miles by the C.N.R., Kamloops to Okanagan; 150 miles by the C.N.R. on Vancouver Island; 50 miles by Kettle Valley Railway, Hope Summit to Fraser River, and the balance by the Esquimalt & Nanaimo Railway, between Parksville and Courtenay, Vancouver Island.

Following the announcement by General Manager Chamberlin that the Grand Trunk Pacific would commence operations on two lines of railway into Weyburn this year, increased interest has been manifested in that southern Saskatchewan town. Real estate values have gone forward during the past two weeks with a rush, and a number of extensive deals involving outside capital have been put through. Inside property that was selling five years ago at $30 per foot, is now being turned over as sites for business and industrial premises at anywhere from $200 to $275 a foot frontage, and promises to reach the $300 mark in the immediate future. Several acreage propositions have been taken up this month, and there is a probability that new sub-divisions will go on the market at once. The year's building programme has been entered upon, two new office buildings being in course of erection on the main street. Tenders closed at the end of last month for the new C.P.R. depot and the McKinnon department store. The latter is a five-storey block, 120 by 160 ft., and will cost $100,000. There is a heavy demand for business premises which cannot be met until additional buildings are erected.

Plans for the new central building of the Y. M. C. A., at Toronto, have been finally approved. The estimated cost is placed at $529,600.

Architects' Scale of Charges in Quebec

As the outcome of recent representations to the Provincial Government the Lieut.-Governor-in-Council has approved of a new schedule of minimum fees for the Province of Quebec Association of Architects. The Association asked for a flat commission of five per cent., in place of five per cent. up to $50,000, four per cent. from $50,000 to $150,000, and three per cent. over that amount. The following is the new list of commission for services rendered by members of the Association:—

No. 1.—The architect bases his professional charges upon the entire cost to the owner of the building, when completed, including all the fixtures necessary to render it fit for occupation, and is entitled to extra compensation for furniture and other articles designed or purchased by the architect.

No. 2.—If any of the material or work used in the construction of the building be already upon the ground, or come into the possession of the owner, the value of said material or work is to be added to the sum actually expended upon the building before the architect's commission is computed.

No. 3.—Travelling expenses are to be paid by the client.

No. 4.—The charge per day to be made by an architect shall depend on his professional standing, but the minimum charges shall be $15 per day.

No. 5.—In all cases, where an architect is subpoenaed professionally as a witness in court, he shall be entitled to a fee of $4 per day of attendance.

No. 6.—Drawings and specifications, as instruments of service, are the property of the architect.

No. 7.—In consideration of the charges mentioned hereafter, the architect shall prepare drawings and specifications, as originals, and provide copies of these drawings and specifications for the use of the contractors, but he shall be entitled to have all the originals and copies returned to him when the work shall be completed.

No. 8.—For professional services in connection with all buildings, comprising preliminary studies, complete plans, specifications, details and superintendence, the architect shall be entitled, except as hereinafter provided, to a commission of five per cent. on the total cost of the building when completed.

No. 9.—For all works of addition, alteration, or restoration, the architect shall be entitled to a commission of seven and one-half per cent. on the cost of the works.

No. 10.—For all other works of special character, viz.: —For monumental work, fittings and furniture, and for decorative work, stained glass and such like, the architect shall be entitled to a commission of ten per cent. on the total cost of the work.

No. 11.—Partial charges, in the case of sub-division or discontinuation of the work shall be as follows:—

For preliminary studies (sketches), one-fifth of the above charges.

For complete plans and specifications, including the preliminary studies, one-half of the above charges.

For details, one-fifth of the above charges.

For superintendence of the work, when drawings are not furnished, two and one-half per cent. on the cost of the works.

No. 12.—Where engineers or other experts are employed by the owner to co-operate with the architect for certain works (as for heating, ventilation, electric work, etc.), the architect shall receive for his commission two and one-half per cent. of the cost of such work.

No. 13.—For valuation of property requiring measurement and detail estimate, where the value shall not exceed $5,000, the commission shall be one and one-half per cent. Where the value exceeds $5,000, the commission shall be one and one-half per cent. on the first $5,000 and one per cent. on the remainder.

No. 14.—In case the owner of the building should require the services of the architect to prepare quantities, or for measurement of the work done or to be done, such service shall be paid (outside of the regular commission) at the rate of two per cent. on the valuation of the cost of the work.

No. 15.—Should the owner desire to have a clerk of the works in the building the said clerk of work shall be engaged and be under the direction of the architect and shall be paid by the owner.

Annual Banquet Quebec Builders' Exchange

There was an excellent attendance at the annual banquet of the Quebec Builders' Exchange held recently at the Kent House, Montmorency Falls. The president of the Exchange, Mr. E. T. Nesbitt, was in the chair. Notable among the guests were His Worship, Mayor Drouin; Mr. W. A. Marsh, president of the Quebec Board of Trade; Ald. O. Morin; Hon. L. A. Taschereau, Provincial Minister of Public Works and Labor; Mr. A. Galipeault, M.P.P., and Mr. P. L. Lamonde, vice-president of the Exchange.

The usual loyal toast to His Majesty having been duly honored, Mr. Nesbitt delivered an interesting address in which he referred at some length to the development of the Exchange. The membership, he said, was increasing in keeping with the general prosperity of the building business throughout the country. In 1911 an average gain of 28 per cent. had been made in the leading cities of the Dominion. The speaker deplored the fact that Quebec did not appear among the building cities and appealed strongly for the establishment of a statistical bureau. Quebec had every prospect of prosperity during the coming season. Exceptional activity might be expected in public and municipal work. Mr. Nesbitt referred to the city's need for cheap electrical power and urged the municipal authorities present to head a movement in this direction. In conclusion, Mr. Nesbitt referred to the public works necessitated by the terminus of the Transcontinental Railway and commenting upon the delays expressed the fear that these might prove fatal to Quebec. If the port of Quebec were not equipped in time to receive the business which the railway would bring from the west it would naturally find its way into Montreal and thence to Providence or Boston. Mr. Nesbitt suggested that during the construction of the Quebec Bridge a car ferry service between the two shores should be inaugurated by the government.

The Honorable Mr. L. A. Taschereau expressed the greatest optimism in regard to the city's future. He contended that the Province of Quebec had maintained the lead of all the provinces of the Dominion, both in regard to population and otherwise. Noteworthy achievements of the Quebec Government cited by Mr. Taschereau were the good roads development and the construction of technical schools.

His Worship, Mayor Drouin, counselled patience in regard to public work at Quebec. He had every faith in the government that the outstanding advantages of the old capital would be adequately recognized.

A toast to the architects was responded to by Mr. R. P. Lemay, and one to "Our Association" by Mr. C. E. Morissette, contractor.

Messrs. Hutchinson & Ford, architects, Victoria, B.C., have dissolved partnership. The business will be carried on by Mr. Ford.

Workmen's Compensation for Injuries

Employers Dissatisfied with Present Conditions—An Equitable System Outlined—Theory of Professional Risk—Individual and Collective Liability

Of all questions of live concern to the constructional interests that of compensation is the most vital. For many years past compensation for injuries to workmen has provided the readiest means of losing, misapplying and abusing money in the building trades. No source of leakage has been more prolific. Sympathy and ignorance have entered so largely into nine verdicts out of ten that in just so many cases the real victim is the employer and not the workman. Contractors cannot fail to be interested in any earnest effort made on their behalf to solve the various problems arising out of workmen's compensation—particularly so, in view of the fact that in the province of Ontario alone the changes suggested in the present system involve a possible additional expenditure ranging all the way from two to eight million dollars annually. The following address was given by Mr. F. W. Wegenast, Legal Secretary of the Canadian Manufacturers' Association, at the recent Toronto convention of the Canadian National Association of Builders' Exchanges. We report Mr. Wegenast's remarks extensively in compliance with a number of requests made at the above meeting.—Editors.

MR. F. W. WEGENAST:

I am very pleased to have this opportunity of discussing with you the important subject of compensating workmen for the effects of injuries received in the course of their employment. It is a subject of common importance to your body and to the body which I have the honor of representing in the investigation now being conducted on behalf of the Ontario Government by Sir William Meredith.

In the remarks I have to make I believe I shall be safe in assuming that you as builders and contractors share with the manufacturers of this country the same interest in the welfare of the workmen in your employ, the same desire to prevent as far as possible, the occurrence of accidents, the same desire to see the unfortunate victims of accidents and their dependents provided for, and the same dissatisfaction with the methods and conditions under which compensation is at present administered.

I venture to say that there is not an employer present who is satisfied with the present law or the present system. And the dissatisfaction is not confined to the burden which it places upon employers. Notwithstanding what is sometimes alleged by our friends the labor agitators and sometimes, perhaps, credited by the public, there is not an employer who would not willingly and cheerfully pay the money which is at present paid out towards compensation, and in fact pay a good deal more, if it were done with the knowledge that the money was applied to its intended use and not wasted in useless litigation and other expense. I have not found an exception to the rule that employers are willing to provide adequate and even generous relief to their employees and their dependents, nor have I found an exception to the rule that they are unwilling to provide fees for ambulance-chasing lawyers and excessive commissions and profits for insurance agents.

It may be known to many of you but it is worth repeating that of every dollar at present paid out by you in the form of liability insurance seventy-five or eighty per cent. is lost in the transit to the pockets of the workman. This represents a condition of things which employers should set about to remedy, and which is, as a matter of fact, rousing a great deal more interest and intelligent thought and action in the employing bodies than in the ranks of workmen, either organized or themselves.

As a matter of fact the interest of employers and workmen are in this subject almost entirely coincident. The proceedings before the Commissioner of the Ontario Government have already revealed the fact that the employing and labor interests are unanimous upon practically every feature except the one question of where the money is to come from.

I may, perhaps, without going out of my way, express my gratification at the attitude of the representatives of the labor organizations in the investigations before the Commissioner. They have not at all times been unprejudiced and fair, and have not at all times avoided the temptation to oppose for the mere sake of opposition, but they have at least not displayed the blind fatuity and lack of intelligent self-interest which has resulted in saddling some other jurisdictions with systems producing a maximum of irritation to the employer with a minimum of benefit to the workman.

The subject is a very complex and many sided one. It presents a variety of phases, each of which must be carefully examined and reckoned with before any opinion can be arrived at which is of any practical value.

In the first place, there is the historical phase, which in framing some of the systems has been neglected, with disastrous results. Because of the time and pains,—and they are considerable,—required for an adequate study of the experience of other countries and other jurisdictions many costly experiments in the class of legislation have been and are being needlessly repeated. Nearly all the civilized countries of the world have now in operation some form of compensation act. The province of Ontario and Prince Edward Island in Canada and most of the States of America have not yet adopted such legislation, but these are the outstanding exceptions, practically every other civilized jurisdiction now having some system in operation. There is, I venture to say, no suggestion of a solution that could be offered which has not been tried out in practice, and for which there cannot be found an exponent in some existing or defunct system. There is no occasion, in fact no excuse, for originality in dealing with the question, and the problem of compensation in one aspect resolves itself simply into an examination of the systems of other countries and the selection of that system or those features which promise the best results in this country.

Unfortunately seven of the nine provinces of Canada have within the last few years embarked upon further experiments with systems entirely discredited by the experience of other countries, and this renders a satisfactory solution in those provinces a matter of some difficulty. In the province of Ontario the ground is entirely clear and I am hopeful that it may be possible to establish in this province a system which shall represent the accumulated experience of other countries as well as the wisdom of our own, and which serve as a model and inspiration to the other provinces of Canada.

The Economic Phase

Then there is the economic side of the problem. The whole question is very interesting to students of political economy as a phase of modern social evolution. I need not say that it is the economic feature which is of most direct concern to us as employers in the question of the effect on our balance sheets. Employers in the province represent an annual pay-roll in the neighborhood of $200,000,000. It depends upon what system we adopt whether we shall start out with an average rate of about one per cent. or less or an average of as high as four per cent. The question of the system to be adopted, therefore, involves a possible difference to employers in immediate annual cost of from two to eight million dollars,—and that difference may arise, as I shall show you presently, between systems conferring practically the same scale of benefits upon the workman.

In connection with the economic phase it is proper also to mention the conservation phase of the subject. The subject of workmen's compensation is intimately related to the subject of accident prevention. A good deal is being said about the preservation of our natural resources. Is there any resource of greater value to this country than the life, health and industrial efficiency of our workmen, and if it is found that any system, no matter what its advantages otherwise, does not measure up to the standard of greatest efficiency in promoting the safety and health of workmen, it cannot be permanently or even temporarily satisfactory.

Then there is, as many of you have discovered to your sorrow and cost, a legal side to the question. I do not propose to speak of this except incidentally. I know that you have from experience become thoroughly posted as to the general features of the legal situation in Ontario. You know that you are liable to an action at law if the workman can prove that you have been negligent or have omitted some statutory duty, or, in certain cases, if injury is caused by the negligence of a superintendent or foreman, or by the condition of the ways, works, machinery, etc., upon which the workman is engaged.

Then there is, I may say, though I must not discuss it, a political side to the question.

And lastly, for the purpose of my remarks, there is an actuarial side of the question which to me grows in importance the more I consider it. The question of the form of insurance and especially the proper method of computing and assessing insurance premiums is one of the most important and, considering it in its results, perhaps the most important phase of the whole subject.

But I will defer any further remarks on these different phases until I have outlined what I consider to be the chief features of a satisfactory compensation system. These are summarized in a report of the special committee which considered the subject for the Canadian Manufacturers' Association and read as follows:

Summary of Principles

First.—For reasons both humanitarian and economic the prevention of accidents should be a prime consideration in any scheme of workmen's compensation, and no system can be satisfactory which will not tend to produce the maximum of effort and result in conserving the life, health and industrial efficiency of the workman.

Second.—Relief should be provided in every case of injury arising out of industrial accident. Such relief should not be contingent upon proof of fault on the part of the employer, but gross carelessness, drunkenness or intentional wrong on the part of the workman should be penalized in some way.

Third.—The system of relief should be adapted to cover wage-workers in every industry or calling involving any occupational risk and should not be confined to such industries as railroading, manufacturing, building, etc.

Fourth.—The relief should be as far as practicable by way of substitution for the wages of which the injured workman and his dependents are deprived by the injury. It should as a rule be periodical and not in a lump sum.

Fifth.—The relief should be certain. It should not depend upon the continued solvency of the employer in whose service the injury was sustained.

Sixth.—The amount of compensation should be definite and ascertainable both to the workman and the employer. The system should entirely displace the present method of compensation by an action for damages, and the employer should not be subjected to any further liability except in cases of gross carelessness or intentional wrong on the part of the employer.

Seventh.—The funds for relief should be provided by joint contributions from employers, workmen and the state. Employers and workmen should pay in such proportion as represent the number of accidents occurring by reason of the hazard of the industry and the fault of the employer on the one hand and the fault of the workman on the other.

Eighth.—The system of relief should be such as to secure in its administration a maximum of efficiency and economy, and as large a proportion as possible of the money contributed should be actually paid out in compensation.

Ninth.—The procedure for the adjustment of claims should be as far as possible dissociated from the regular courts of law. It should be simple, and calculated to involve in its operation a minimum of friction between employer and employee.

Tenth.—The system of compensation should be directly associated with a system of inspection with a view to the prevention of accidents and a system of prompt and export medical attendance to mitigate the effect of injuries.

Eleventh.—The system should be such as to secure as liberal measure of relief as possible without undue strain upon industry.

Twelfth.—The system should be such as to afford some promise of permanency.

Upon the first of these principles, that dealing with the importance of accident prevention, I need make no extended comment. An ounce of prevention is worth a pound of compensation. I have referred to the movement in the direction of conservation of our natural resources. Even from a purely material standpoint the muscles and brain of our industrial works are the chief of our resources. We spend large sums of money upon technical schools and colleges and other educational facilities for training the hand and the eye and the mind of our workers, and we take no pains, whatever, at all events by systematic effort, to conserve and to protect what it has cost years of time and much money to create. I have avoided speaking of the purely humanitarian phase, not because I do not regard it as important but because it is unnecessary. The material and economic side of the question is entirely sufficient to invoke your efforts; but I do not wish to be understood as intimating for a moment that you are oblivious to the humanitarian aspect. I do not believe that there is an employer within the sound of my voice who would not be moved by purely humanitarian considerations to take every necessary and reasonable step to prevent accidents at a cost very much greater than at present, if the proper facilities were afforded; and I do not believe that there is a single man among you who would sanction the introduction of a compensation system, no matter what pecuniary and other advantages it might present if it were deficient in respect to the one feature of inducing the highest degree of preventative activity.

Theory of Professional Risk

The second principle we have laid down embodies what is known as the Theory of Professional Risk which is the basis of practically all workmen's compensation laws. Under this theory the cost of human wear and tear is supposed like the cost of machinery, raw material, etc., to be thrown upon the industry and included in the price charged to the consumer for the product of the industry. Whether or not we agree with this theory as representing a correct economic principle, we must recognize that it is the foundation of principle underlying all workmen's compensation legislation. You may ask, why should we as a body of employers endorse and why have the Canadian Manufacturers as a body endorsed such a far-reaching and if I may so designate it, such a radical and socialistic principle. I think I could give you a number of reasons besides the two which I will suggest. These are, in the first place, that the amount of money which it would be necessary to expend in determining in particular and individual cases the question whether or not the employer was in fault and the question whether or not the employee was in fault will go a long way towards compensating and will in effect probably be more than sufficient to compensate all the undeserving cases. There must of course as we have suggested be some method of penalizing carelessness and intentional misconduct, but it is a serious question to what extent the penalty should assume the form of witholding compensation. The second reason is that the effect of the injury is just as serious whether the employer or the man himself is at fault; and the burden in most cases falls most heavily upon innocent dependents who certainly have not been at fault. While this argument is based upon humanitarian grounds it has prevailed in most jurisdictions and even under the English Act where compensation is paid directly by the employer himself the serious and wilful misconduct of the employee does not disentitle where the injury results in the death of the employee.

With regard to the third principle, namely, that the system should be adapted to cover all occupations I may say this: we do not propose to show an undue solicitude for the welfare of the agricultural laborer, nor do we propose to insist that the farmer and the employer of domestic servants should be included merely as a protest against discrimination. I think it fair to say, and I do say, that if it is fair to burden the employer in industrial occupations with the burden of compensation it is fair that the employer in agriculture should bear a similar burden. And there is no answer to the argument that the farm laborer who is unfortunate enough to sustain injury is as much entitled to compensation as his brother worker in a workshop or on a railroad. I think we may be satisfied to do one thing at a time and do it well. There can be no doubt, in view of the history in every other country, that the farm laborer and the domestic, in fact all wage-workers will untimately be brought under any system that may be adopted. The serious consideration in the Province of Ontario at present is that the system which is adopted shall be one which will be fair and practical when the time comes, whether sooner or later, for its extension to agricultural and other industries.

With regard to the fourth principle, that the payment of compensation should be periodical and not in a lump sum, I need only say that this is approved by all the expert opinion upon the subject. The class of persons for whose benefit compensation legislation is enacted cannot, as a rule be trusted with the handling of large sums of money and the result of a lump sum payment would be in most cases that the money would be quickly spent, not to say wasted, and that the persons for whose benefit it was paid out would again be thrown upon public institutions or charity.

The fifth principle which calls for certainty and solvency is so obviously correct that it requires no supporting argument.

The sixth principle involves the wiping out of the present remedies by action at law. I need not present any labored argument to a group of employers as to the advisability of replacing the present wasteful and irritating methods of adjudication by simple and direct method of adjustment and of removing from the workmen the glamor of a speculative jury verdict which so long as it remains must be a fruitful source of litigation.

With regard to the seventh principle I may say that the only serious divergence of opinion that exists between the employing and labor interests of the province has been the question of where the money is to come from. Our labor friends are quite willing that the Government should contribute to the cost of compensation and they are quite willing that the employer should contribute the balance. What has been proposed on behalf of the Canadian Manufacturers Association is that the province should contribute an amount representing the cost of administration of the fund so that every dollar paid into the fund will be paid out by way of compensation. Of the money paid in by way of insurance premium it is proposed that workmen shall pay a proportion representing approximately the proportion of accidents shown by statistics to be caused by the carelessness of the workmen. This proportion has been shown to be pretty constantly in the neighborhood of 29 or 30 per cent., and it is suggested as a fair proposition that workmen should pay by way of deduction from their wages 25 per cent. of the insurance premium paid in by employers.

Another method of contribution by workmen which finds more favor with workmen that the direct money contribution by deduction from wages is a first aid fund for the purpose of taking care of workmen during the first few weeks after the occurrence of the accident. By making this fund cover both accident and sickness as well as medical and hospital expenses and by assessing the premiums for the fund on employers and employees jointly a less direct and probably more satisfactory method of contribution can be worked out.

The rest of the principles in the statement which I have read are none the less important because they are so obviously correct as to require no elaboration. I shall leave them to be dealt with in the latter portions of my remarks.

Individual Liability Method

Under an individual liability system the liability to compensate the workman is thrown upon the individual employer as an element of the relationship of employer and employee. A term is imposed upon the contract of employment by which the employer assumes an obligation, more or less extensive, to indemnify the workman for injuries received in the course of, or in connection with, the employment. The injured employee looks for his relief to his employer, who thus becomes an individual insurer of the workman against injury. The principle of individual liability is illustrated in the English Workmen's Compensation Act of 1897, as extended in 1906, and in the Acts which are now in force in seven of the nine provinces of Canada, including the province of Quebec. I am aware that the Act of the Province of Quebec was copied to a large extent verbally from the law in force in France, under which a state guarantee system is set up; but by the omission of the provisions of the French law respecting the participation of the State, the Quebec Act was made merely a replica of the English Act couched in different phraseology. The English system has also been copied in other portions of the British Empire and in a number of states of the United States. In all these jurisdictions employers within the scope of the laws are required, regardless to a very large extent of questions of fault, to compensate their employees for injuries received by them in the course of their employment. Employers are, of course, permitted, and in some cases encouraged, to insure themselves against their liability for compensation by some form of insurance.

Two Classes of Insurance

Right here let me point out a vital distinction between the two classes of insurance, a consideration of which is involved in any discussion of the subject of workmen's compensation. There is on the one hand accident insurance, and on the other employers' liability insurance. A great deal of confusion in discussions of the subject is due to a failure to distinguish the two types of insurance, and superficial theorists who have advocated the so-called voluntary insurance system as against the so-called compulsory insurance system, have argued that the employer who finds himself under the heavy obligations imposed by an individual liability law will almost inevitably resort to insurance. This is in one sense true, but the insurance which the employer thus effects is not of a type which affords any great protection to the workman. It is true that some employers under these systems take out real accident insurance policies for the benefit of the workman killed. Such insurance may cover the risk of injury in the course of employment only, or may be extended to any accident of the workman regardless of the occasion. The essential features of this class of insurance is that it is the workman who is insured. The large bulk of employers, however, for reasons which are quite apparent, insure, not the workman against accidents, but themselves against liability for accidents. And this practice has occasioned the development, in all jurisdictions where the compensation legislation takes the individual liability form, of a system of employers' liability insurance. Under this type of insurance the employer insures not the workman against accidents, but himself against liability. Liability insurance bears to accident insurance a relation analogous to that which would exist between a policy under which a man should insure himself against legal liability for non-support of his wife and children and an ordinary accident of life insurance policy.

Collective Liability Method

Under a collective liability system the obligation to compensate the workman for injuries is thrown upon employers collectively, in groups by industries or by geographical districts, or otherwise. Employers are encouraged or compelled to combine in associations for the purpose of insuring workmen against accidents and providing the funds for the purpose. The injured workman looks for compensation, not to the individual employer, but to the association of employers or the collective fund. The principle of collective liability is illustrated in the system of Germany and many of the other European countries, and in the system recently adopted by the State of Massachusetts. The German system being the oldest and being more elaborately and scientifically developed, is usually cited as the type; but there are many variations in the applications, in different jurisdictions, of the basic principles of the German system.

It should be observed that the German system is not a state insurance system. The state participates only to the extent of compelling employers to organize. It also assists in defraying the expenses of compensation.

State Insurance

Under a state liability or state insurance system, the obligation to compensate the workman is assumed by the state itself and the cost is levied upon employers, or employers and workmen jointly, by the exercise in some form of the taxing power of the state. The state insurance plan is illustrated in the Act recently adopted by the State of Washington. The Washington system is, of course, not the only state liability system in the United States, though its operation is the most simple and direct Under the Washington system compensation is paid and administered by a state department in charge of a commission. Compensation on a fixed scale is paid out of a fund created by levying insurance premiums, in accordance with a schedule in which different classes of industries are graded according to relative hazard and the premiums fixed as a percentage of the pay-roll. Provision is made for the equitable adjustment of the premium rates from time to time. The compensation provided in the case of death consists in the expenses of burial, not exceeding $75, and the payment of $20 per month for life to the widow or invalid widower with an addition of $5 per month for each child under the age of sixteen years; the total not to exceed $35 per month. The estimated capital amount of this payment is $4,000, which is set apart out of the general fund in each individual case to provide a special fund to meet the payments, any surplus or deficit being adjusted with the general fund. The department charged with the administration of the Act is called the Industrial Insurance Commission and consists of three commissioners appointed by the Governor, with a staff of auditors, assistants, etc. This commission adjusts all claims for compensation on sworn reports from the different parties interested. The commission has power to hear evidence, to make independent investigations and to rehear and readjust, its findings being subject to review by an appellate court. I mention these details of the Washington system in view of the public attention it has attracted and for purposes of reference presently.

I would like if I had time to emphasize the distinction which I have drawn between the three different methods of compensation—a distinction which, in my opinion, goes to the root of the whole question. It is not a question of compulsory or voluntary insurance, or of stock or mutual or state insurance of a German or English system, but of the incidence of the initial liability—whether it rests upon the individual employer, or employers collectively, or upon the state as representing the community at large. But I must pass on to a consideration of the elements which would constitute a satisfactory compensation system, with a view to determining what facilities the three respective methods which I have mentioned afford for the realization of these elements.

Which System is Best?

What facilities do the three methods of compensation which I have mentioned above respectively afford for the realization of a system embodying these features; and to what extent do the various existing systems measure up to the standard? In answering these questions it is not necessary to resort to guess work, but it is possible to present in almost every case overwhelming statistics and proof.

The individual liability systems are found to violate almost every pirnciple above set out. They do not tend to prevent accidents. This statement is supported not only by the unanimous opinions of investigators but by the official reports of commissions and other investigating bodies in those countries where individual liability systems prevail. The departmental committee which in 1904 investigated the operation of the English Act preparatory to its extension in 1906, reported that "no evidence has been brought us which enables us to find that any great improvement in the direction of safety has to be placed to the credit of this Act. Ineed some of the evidence rather points in the opposite direction. An individual liability system cannot well be operated so as to secure periodical payments as opposed to lump sum payments of compensation. No individual liability system can afford any assurance that the compensation payments will be made, or continue to be made, there being no guarantee of solvency on the part of those charged with payment. The individual liability systems have been proven to be wasteful in the extreme. A large percentage of the money paid out in contributions by way of employers' liability insurance being taken up by commissions, expenses of litigation, profits, etc. The workman is obliged to resort to legal or quasi-legal process to enforce his claim against the employer. The latter is supported by the employers' liability insurance companies with their superior facilities for contesting claims and the settlement of each claim involves a direct contest between employer and workman.

Further Weaknesses

Nor does the individual liability system offer any promise or probability of permanence. The English Act is generally regarded as representing only a stage in the development of a system. In Manitoba, where an Act on the lines of the English Act came into force in 1909, there is already a demand for a change to a system of state insurance. The same remark applies to other individual liability systems.

And it must be observed that a change from an individual system to a collective or state system involves the wiping out of the liability insurance companies, which are a necessary accompaniment to an individual liability system.

Without going into further details of the operation of the system of individual liability it may suffice to say that expert investigations are unanimous in their condemnation of the system. And I may report once more that their views are based not upon theories, but on statistics and facts, which are susceptible of proof to a demonstration.

Collective and State Systems Successful

The systems of collective liability on the other hand have been almost uniformly pronounced satisfactory in their operation. The type system, that of Germany, is the outstanding example of a successful solution of the problem and the criticisms upon it are attributable almost solely to defects in the details of administration. The principal defect complained of, for instance, from the employers' standpoint is the policy which is enforced by the government of accumulating a large reserve fund by the imposition of premium rates in excess of the current cost of maintenance; and the question over which the greatest controversy exists is the "doctor question," namely, whether the employers' or the employees' physician should have charge of cases of injuries.

The principle of State liability as applied in the State of Washington and other States, as well as a number of European countries, is also approved by expert investigators. Constitutional and other practical difficulties have interfered with the introduction of a state liability system in many jurisdictions where it was otherwise regarded as desirable, and the experience of those jurisdictions which have adopted the system has called enthusiastic recommendation from employer and workman alike, as well as the general public.

The Actuarial Aspect

There is an actuarial side of the problem which is of the most vital economic importance. Assuming that a system is to be established on a periodical payment plan, the question arises as to what basis should be adopted for fixing the premium levies. I have pointed out that under the Act of the State of Washington the periodical payments due in case of death are capitalized at the time of the injury, a payment of $20 per month being considered equivalent to a capital sum of $4,000. The question arises whether there should be collected for the year in which the accident happens the whole sum of $4,000 or only the $240 required to meet the payments of that year. The two actuarial plans may be respectively called the capitalized and the current cost plan. Under the current cost plan of course the annual rate would gradually rise as the number of beneficiaries increased, until the rate of payments lapsing by death equalled the rate of accessions by accidents. The annual rate would only reach its minimum after a period of about thirty years; but then the rate would be only the normal capitalized rate. This was the actuarial plan adopted in the German system. It represents a minimum strain upon present industry and does not involve the shock to the economic system which is incidental to a system where the cost of compensation is capitalized at the time of the injury.

One of the greatest defects of the English system—and in this respect it is on a par with some of the collective liability and state liability systems—is that it represents a maximum strain upon industry. Under any system of individual liability it is necessary to capitalize the periodical payments due to the workman or his dependents by setting aside a sum sufficient to take care of those payments for the future. Thus the capitalized value of the payments under the Washington Act in the case of death is $4,000. The setting aside of this sum would involve an assessment on the annual pay-roll of industries varying from 2 to 10 per cent. Under a collective or state liability system it is not necessary to set aside this capital amount. All that is necessary is to collect each year a sum sufficient to take care of the periodical payments due during that year.

Current Cost Plan

A state insurance or a compulsory collective system can be conducted on a current cost plan. An individual liability or a voluntary mutual insurance system cannot be so conducted, and in such systems it is necessary to capitalize the periodical payments at the time of the injury. The introduction of such a system in Ontario would involve the immediate imposition of a premium rate averaging approximately four times the rate at present regularly paid for employers' liability insurance. This would represent a very serious strain upon many industries already running upon narrow margins of profit.

A capitalized system involves another condition which is a very serious economic consideration. A capitalized system involves the setting aside of large sums of money in the form of reserve to meet future compensation payments. Even under the German system there is, as I have mentioned, complaint that the margin of approximately 9½ per cent. of the premium rate regularly set aside for a reserve fund is too large, and that the capital should be left in active use in the industry. The reserve fund in Germany has, in fact, reached immense proportions. One of the greatest economic defects of the English system is that it involves the piling up of immense sums in trust funds—a large proportion of it in the hands of county court judges in trust, and in trust and loan companies as a reserve against funds from active industrial circulation is a serious handicap to national industry. It may be argued that this capital finds its way, in part at least, back to industrial channels, but it has in the meantime lost its fluidity and to a considerable extent its economic efficiency. The constant argument even under the German system is that it should be left in active use in the industry and for its development.

The Government's Opportunity

These actuarial and economic features illustrate the complexity of the problem and the necessity of the most serious consideration before committing the province to any system which not promise a satisfactory solution. It would be nothing short of a calamity if the province, having deferred legislation until after nearly every other civilized jurisdiction has adopted a plan, should now begin to experiment with systems discredited by the experience of other countries. The Province of Ontario has in times past been a pioneer in many excellent types of legislation, which have been copied by our sister provinces and by other jurisdictions. I am hopeful that the Province of Ontario may again take high ground and formulate a system which will represent the concentrated experience of other jurisdictions as well as the wisdom of our own, and afford a permanent and satisfactory solution of this important problem.

Trade Conditions at Calgary

Continuous Activity — Preparations for a Record Building Season—Many Important Plans Under Way

Correspondence of the Contract Record

Calgary, Feb. 28, 1912.

Calgary does not hibernate. Building operations have been continued practically without interruption throughout the winter months. The work included a large amount of bricklaying and mason work, including all the concrete foundations for the new C. P. R. hotel, as well as the company's new depot. Quite a number of new warehouses and other work could be mentioned.

Building work has now opened up in full swing and the permits for February are approaching the $1,000,000 mark,—as compared with only $330,000 for the corresponding month last year. This fact in itself is sufficient to warrant the optimistic view taken by some Calgarians that the value of the building in this city for the current year will reach some $20,000,000.

The contract for the new Knox Church to be erected on Sixth avenue west has been let to the Fyshe-Martin Company, Limited, of Calgary, and work is now proceeding on this imposing edifice. The design is pure Gothic and will be executed in local sandstone with Indiana limestone tracery to windows and Nave arcade. The total cost will exceed $200,000. The architects for the work are Messrs. Allen & Collins, of Boston, associated with Mr. F. J. Lawson, of Calgary.

New C. P. R. Car Shops

An important announcement has been made by the Westinghouse Church Kerr Company, of New York, to the effect that operations on the new C. P. R. car shops will be commenced at once and carried on as expeditiously as possible. Mr. T. H. Gilmore, representing the contractors, is in town and states that he expects to have the buildings enclosed before the next winter sets in, and the entire plant complete early next year. The Calgary shops will be similar to the Angus Works in Montreal, and will consist of the following: scrapdock building, foundry, pattern shop, oil house, storage house, locomotive repair shop, paint shop, transfer table, power house, locomotive storage house, coal and fuel house, material bins, freight repair shops, dry kiln, planing mill, flue storage, iron house, lumber store, etc. In the freight repair sheds there will be ten tracks with a capacity of 150 cars. In the centre of the plant there will be a large water tower tank, 125 feet high, containing 125,000 gallons to supply the various departments. The city authorities have undertaken to connect water mains and sewer without delay so that there appears little likelihood of anything occurring to prevent the expectations of the company from being realized.

A company has been formed to construct and operate the Marharg Electric Railway which will connect the city limits with the car shop district, some five miles distant. The incorporators are Messrs. C. A. Owens, G. de C. O'Grady, Joseph Ruse, G. M. Adams and F. U. Phillips, of this city.

Several new apartment buildings are planned and tenders called for, whilst the foundation of the Mountain Spring Brewery in the Manchester Sub-Division has been let to Messrs. Jones & Lyttle, general contractors. This will be a modern establishment in every respect and is being erected by Messrs. Conrad & Knapp, of Sault St. Marie. The estimated cost, including equipment, will be considerably over $200,000.

Another important industry to be located in the Calgary vicinity, is that of the Dominion Bridge Company. A site has been purchased at Beddington and it is generally reported that a large plant will be erected this year. When it is remembered that the enormous sum of $60,000,000 will be expended on railway construction west of the Great Lakes this year, and when one considers the large amount of steel necessary for bridgework, not to mention the structural steel required for building, it can be readily understood that an industry of this kind is much needed in the Western Provinces. The difficulty and delay at present experienced in importing steel from Eastern Canada has greatly handicapped construction in Alberta.

It is announced that Calgary is to have five hundred new telephones. Calgary needs them. The system is of the automatic type and is operated by the government. Much criticism has recently been voiced in the local press by would-be subscribers who at present find it impossible to obtain a telephone, and the matter has been taken up by the Board of Trade, who sent a delegation to Edmonton to interview Premier Sifton. The additional phones are no doubt a result of this action.

Much satisfaction is felt in the city over the splendid reception of the $2,000,000 4½ per cent. Calgary debentures floated recently. Underwriting arrangements were completed by the Bank of Montreal at 101½ and the issue was over-subscribed.

Many extensions to the municipal street railway system have been decided upon and some thirteen miles of new track will be laid during the summer. New rolling stock is arriving and will be put into service immediately. The system proved a sound financial investment and has earned a net profit of $120,000 for the past twelve months, having transported 8,838,057 passengers during that period.

The Governors of the Calgary College are asking the architects of the Dominion to submit sketch plans for an Arts Building to cost $250,000. The construction is to be commenced as soon as plans are decided upon, the necessary funds having been subscribed by the people of this city. The surrounding site will be planned by a landscape artist and it is expected that a most picturesque result will be attained. The site overlooks the entire city.

The Labor Outlook

Some anxiety is felt as to what will be the trend of the labor market in this province during the busy season. At present the supply is adequate to meet local needs, but it is realized that if work increases at the present rate considerable difficulty will be experienced. Plasterers, plumbers, roofers and common laborers will be difficult to obtain owing to the great demand for all classes of help in the railway construction camps which will invade the province during 1912.

The local press have been advertising "Why go to California when we have such weather in Alberta?" and the comparison is not an odious one. The climate during the past two months has been similar to the sugar-making season of the East. We Westerners certainly have reason to congratulate ourselves considering the extreme winter experienced in other parts of the Dominion. Sunny Alberta is no misnomer.

—Arthur Chamberlin.

Plans have been prepared by the Portland Cement Company for an industrial plant at Marlboro, about 17 miles west of Edson, Alta., on the Grand Trunk Pacific. The proposed plant will cover two acres of ground and will involve an expenditure—on building alone—of $600,000. Already a hotel and stores have been built and the foundations of the factory laid. At the present time twenty men are working on the preliminary structure digging excavations for the kiln buildings.

Railroad Builders of the Dominion

Extracts from the Early Annals of Messrs. Foley, Welch & Stewart—The Firm's Great Construction Record

MESSRS. Foley, Welch and Stewart, who have just entered into a contract to build the Peace River Railway, have probably constructed more railway mileage than any other firm in the world. The principals of the firm have been building lines for over thirty years, but not always under the same firm name, various titles having been employed as the locality of the work and circumstances dictated.

It was about 1893 when the late Mr. Peter Larsen, a millionaire contractor of Helena, Mont., in conjunction with Foley Brothers, the famous railway builders of an earlier generation, invaded Western Canada, the field in which they have made such signal success. Their right hand men in those days were J. W. Stewart, of Vancouver, and Patrick Welch, of Spokane. Subsequently these men won their spurs and acquired a partnership interest.

"Jack" Stewart came to Canada from the Highlands of Scotland with nothing but his bright native intelligence and love of hard work. He obtained his first start as a rodman on the C.P.R. construction, and stayed with it until the prairies and coast had been linked up. Mr. Stewart soon attracted attention. Although not a college-trained man, he showed a remarkable capacity for engineering work. It became a by-word that the reserved Scottish youth could make estimates and figure out curves to the discomfiture of the veterans in the railway business. His rise in the profession was rapid.

He was in Vancouver during the big fire in 1886 and saved himself by standing for hours up to his neck in the waters of False Creek. Later he went to the United States and secured employment with Mr. Peter Larsen, then the biggest railway contractor west of the Mississippi River. Larsen had also begun his career at the bottom of the "grade," and took a liking to Stewart, who was entrusted with the management of large contracts.

It was at this juncture that young Stewart formed the acquaintance of Mr. Pat Welch, then a young man and one of Larsen's trusted assistants. They made an ideal team in handling the big jobs of Larsen, who at times co-operated with Foley Brothers as inactive partners. Welch and Stewart formed a strong friendship. One is the complement of the other.

When the work was secured in Western Canada, Messrs. Stewart and Welch looked after the details, leaving Foley and Larsen to enjoy leisure won by many, many years of hard work. Under different titles these principals built many western lines, including the Columbia & Western branch of the C.P.R., from Trail to Midway, one of the partners at that time being Sir Donald Mann. Other contracts were the Nelson & Fort Sheppard from Northport, Wash., to Nelson, B.C., a large portion of the Crow's Nest Pass branch of the C.P.R. and the V. V. & E. Railway from Marcus, Wash., south of Grand Forks, B.C., to Princeton, as well as the section in the lower Fraser River Valley. For that work the firm was styled Messrs. J. W. Stewart & Company.

The firm of Messrs. Foley, Welch & Stewart, was organized when the principals secured a contract to build the Western section of the Grand Trunk Pacific. It will soon have to its credit the construction of every foot of that line from Saskatoon to Prince Rupert, a distance of 1400 miles. It also built the Lake Superior branch of the G.T.P. from Lake Superior Junction to Fort William, 200 miles; the Toronto-Sudbury branch of the C.P.R.; double-tracked the C.P.R. from Winnipeg to Fort William; built over one-third of the Canadian Northern line between Winnipeg and Port Arthur; rebuilt the C.P.R. main line between Swift Current and Moose Jaw; constructed over a score of branch lines on the prairies for the C.P.R. and completed eighty miles of the C.P.R. irrigation ditch in Calgary district.

The firm joined forces with the Northern Construction Company to build the Canadian Northern from Port Mann to Yellowhead Pass and employs on that work over 6000 men. It is also carrying out the construction of 500 miles of the Canadian Transcontinental from Cochrane, Ont., eastward, as well as 450 miles of the Canadian Northern between Port Arthur and Sudbury.

Mr. Welch and Mr. Stewart are the active heads, as Mr. Tim Foley, of St. Paul, a great builder in his day, is living in retirement. Mr. Stewart's health broke down in December, but he is now recuperating in Pasadena. "Jack" Stewart has the reputation of being the most popular railway contractor in Canada, a reputation won by his many sterling qualities. Mr. Welch "the Irish partner," as he calls himself—has also the best qualities of his race. He has a following that swear by "Pat."

Active preparations are being made for the erection of the C. P. R. machine shops at Calgary, Alta. Mr. F. E. Caldwell, foreman for the Westinghouse-Church-Kerr Company, arrived recently at Calgary in company with Mr. T. N. Gilmour, chief engineer, who went to the city some time ago and surveyed the site. It is stated that within a few days two hundred men will be at work and that before the season is far advanced a force of five hundred will be employed. The total estimated cost of the shops is $2,500,000. Construction work will start as soon as material orders can be placed. It is intended to have the shops in operation December 1st next. The contract includes the design and construction of locomotive, machine, boiler, blacksmith, pattern, coach, freight car repair and paint shops, and foundry, planing mill, power-house, dry-kiln, scrap docks, material bins, storerooms and office buildings. In general the construction will be concrete, steel, brick or hollow tile.

The work of filling in the Great Northern Railway's right-of-way on False Creek is to be started in the course of the next few weeks, and following closely on the heels of this is to be the construction of the wharf on Burrard Inlet and the depot on False Creek, Vancouver. It is expected that by the time the grading is finished the company will have some definite announcement to make, concerning the cost of construction, the extent of improvement, and the nature and location of the improvements. It is learned on reliable authority that the grading work will require between three and four million yards of earth. Regarding the probable cost of the G.N.R. improvements on False Creek, nothing has been learned so far, the plans and estimates being still in the course of preparation.

The London Concrete Machinery Company, London, Ont., have been appointed agents for the Ruggles-Coles portable drier and heater for road work, manufactured by the Ruggles-Coles Engineering Company, New York.

Public Works Engineers

Mr. J. G. Sing, Toronto

Mr. J. G. Sing, Toronto, District Engineer Department of Public Works for Canada, hailed, originally, from Meaford, in the County of Grey, Ontario. In 1881 the late Sir John A. MacDonald appointed him on special work of surveying Dominion Government lands in the North-West territory along the line of the Canadian Pacific Railway, the construction of which commenced that year. He remained with the Department of the Interior for a number of years.

In 1895 he was appointed to survey the Islands along the North-Easterly shore of the Georgian Bay lying between Mouse Deer Point and Waubaushene, belonging to the Department of Indian Affairs. In 1900, while engaged on this work, he was transferred to the Department of Public Works, where he has since remained. For practically seven years he has been District Engineer for this Department, with headquarters at Toronto. The only break was of nine months' duration, when he was in charge of the Eastern District of the Department, with headquarters at London, Ont.

Many important works have been designed by Mr. Sing and carried out under his supervision. Of these may be mentioned the new Western channel, Toronto; the large harbor improvements at Port McNicol—the principal terminal now, on the Georgian Bay, of the C. P. R.—also at Tiffin, one of the terminals, on the Georgian Bay, of the G. T. P.; at the harbor of Midland, Ont.; also at Hamilton, Cobourg, Owen Sound and Sault Ste. Marie. The construction of the revetment wall at Hamilton is an entirely new design for works of this character.

Mr. J. G. Sing, Toronto
District Engineer Department of Public Works

Mr. Sing is considered an authority on harbor design and construction. With the consent of the Department of Public Works, he was retained, quite recently, as consulting engineer for the Harbor Commissioners of Toronto.[*] He is also one of the four experts on the Advisory Board of Commissioners to examine into and report on the present needs and future supply of pure water for the city of Toronto.

Previous to removing to Toronto, Mr. Sing was for twelve years Engineer for the County of Grey.

Mr. Sing is a past president of the Engineers' Club of Toronto. He is also a member of the Canadian Society of Civil Engineers, and an Ontario and Dominion Land Surveyor.

Personal Mention

Mr. P. R. Warren, engineer in charge of Messrs. Norton Griffiths Company's contract in eastern Canada, was in St. John last week making a final report on the location of the dry dock which is to be built by his company in connection with the Courtenay Bay contract. According to Mr. Warren, operations will be under way by the end of March. The work of building the breakwater, wharves and dry dock will be carried on concurrently beginning this summer, but the dredging will not be started until the summer of 1913 as the bog hydraulic dredges required for the work are now being built in England and cannot be ready before that time. Mr. Warren said that five hundred men are to be employed during the present summer and that eventually two thousand will be on the payroll. The company intends building its own offices at Courtenay Bay as well as dwellings for its staff and workmen. The general supervision of the work will be entrusted to Mr. Warren.

Mr. Frank B. Gilbreth, the well known New York contractor, will give an address on Scientific Management at Convocation Hall, University of Toronto, on March 8th at four p.m. This address was scheduled for February 22nd, when there was a large gathering at Convocation Hall in anticipation of Mr. Gilbreth's arrival, but the lecturer was held up in a snow bank and his train did not reach Toronto until the evening. A recurrence of this misfortune is hardly to be expected and a good gathering of the construction interests is assured.

Mr. E. G. Hewson, of the Grand Trunk engineering staff, has been appointed resident engineer of that line in Toronto, succeeding Mr. Power, who has entered the service of the city. Mr. Hewson has been Mr. Power's assistant for nearly three years. Before entering the service of the G. T. R., he was engaged on various engineering works for the Dominion Government.

Mr. J. W. Morley, Winnipeg, Man., was elected President of the International Association of Master House Painters and Decorators at the 28th convention of that body, held recently in Rochester, N.Y. Mr. Stewart N. Hughes, of Toronto, is one of the new directors of the Association.

Mr. A. W. Dow, Member American Institute of Chemical Engineers, chemical and consulting paving engineer, New York City, on February 23rd delivered a lecture on "The Inspection of Sheet Asphalt Pavements" before the graduate students in Highway Engineering at Columbia University.

On February 19th, Mr. Nelson P. Lewis, M. Am. Soc. C. E., Chief Engineer, Board of Estimate and Apportionment, New York City, delivered a lecture on "Design of Highways and Systems of Highways" before the graduate students in Highway Engineering at Columbia University.

The appointment of Mr. G. V. Mitchell as purchasing agent of the Works Department at Toronto was made last week by City Engineer Rust.

Mr. H. N. Ruttan, city engineer of Winnipeg, who has been in Europe for the last four months, is expected home about the end of April.

The resignation of Mr. K. S. Macdonnell, town engineer of Collingwood, Ont, took effect on March 1.

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[*] The text of an interesting memorandum prepared for the Toronto Harbor Commissioners by Mr. Sing will be found in another column under the heading, "Variation in the Levels of the Great Lakes."

Construction News and Notes

It is stated that there is a movement on foot to form a Saskatchewan Society of Engineers, affiliated with the Canadian Society of Civil Engineers.

The Ritchie Contracting & Supply Company, Vancouver, were awarded the contract for supplying 50,000 Anvil Island red pressed brick and for the marble for the new court house at Revelstoke, B.C.

The Verdun council proposes to raise a loan for $229,000, of which $129,000 will be spent on public improvements, including the extension of the electric light plant, the increase of the water supply and the betterment of the fire protection.

The C. P. R. have approximately 475 miles of railroad work to place under contract this season in Western Canada. By December 1, 1912, they will have added 700 miles to their western lines, bringing their total mileage to well over 6,000 miles.

It is reported that the increased amount of apartment house building in Vancouver during the last two years has resulted in an improved market for refrigerators. Manufacturers of this specialty will be well advised to keep an eye on that field.

The Ruggles-Coles Engineering Company, 50 Church street, New York City, and McCormick Building, Chicago, have appointed Mr. J. L. Danziger, 38 St. Sulpice street, Montreal, as agent for the stationary dryers for mining and manufacturing plants.

The building permits of Victoria were swelled last month by the issue of a permit for the additions to the Legislative buildings estimated to cost $1,000,000. The plans for this addition were prepared by Mr. F. M. Rattenbury, and the contract has been let to Messrs. MacDonald & Wilson.

Winnipeg contractors have been tendering on a $200,000 residence for Mr. A. R. Davidson, to be erected on the corner of Ruskin row and Park road, Crescentwood. The exterior is to be of cut stone. The interior is to be finished in British Columbia oak, Circassian walnut, and mahogany.

Noteworthy among the latest incorporations is that of the Atlantic Dredging & Construction Company, Limited, Loggieville, N.B. The new concern is capitalized at $250,000. Among the incorporators may be mentioned Mr. Thos. Nagle, of St. John, and Mr. Richard O'Leary, of Richibucto, N. B.

The city laborers of Victoria, B.C., are applying to the city council for the payment of a minimum wage of $3 per day on civic work. The application was made last year, but the council took objection on the ground that it was made after the estimates had been arranged for the various works.

Announcement is made of the formation of the Canadian Foundries & Forgings, Limited, with a capital of $2,000,000. The company consists of the James Smart Manufacturing Company, Limited, Brockville, the Canadian Billings & Spencer, Limited, and the Canadian Forge, Limited, both of Welland.

According to advices received from Victoria, B.C., the final work on the Dallas Road sea-wall will be accomplished within the next few weeks. The filling in behind the wall is in progress, and as soon as completed the erection of the railing along the top of the wall will be undertaken, thus putting the finishing touches on this important work.

According to a report from Victoria, B.C., a company is about to be formed to take over eighty-five acres of shale property, near Hope Bay, Pender Island, for the manufacture of vitrified sewer and street paving brick, high grade facing and fire brick, and later to develop the sewer pipe industry. The property, which consists of some eighty-five acres, is under option to Messrs. John Bond, James Drummond and J. H. Gray.

Considerable increase in capacity is being arranged for at the plant of the Vancouver Portland Cement Company, Tod Inlet, near Victoria, B.C., and an order has been placed with the Vancouver office of Allis-Chalmers-Bullock, Ltd., for crushing and cement machinery. Notable amongst this machinery is the Gates Breaker which they have ordered, and which is to have a daily capacity of 3,000 tons of rock.

The building trade at Brandon, Man., is giving evidence of great activity this year. Messrs. Shillinglaw & Marshall, architects, report the preparation of plans for the erection of several new buildings and of a three-storey edifice on Ninth street, also that the C. P. R. are preparing to construct a spur line to transfer track for the use of a large warehouse to be built this year for a wholesale company.

A notable competition for architects has been inaugurated by the government of British Columbia. Plans are invited for the new University buildings to be erected at Point Grey, near Vancouver, and prizes of 10,000 will be awarded for the best designs. The estimated expenditure on the proposed work is $1,500,000. Further particulars are given in the advertisement published in this issue under the Tenders Department.

An agreement has been made between the Grand Trunk Pacific Railway and the Dominion Government for the construction of a floating dry dock at Prince Rupert, B. C., to cost approximately $2,200,000, and instructions have been given to proceed with the work. The construction of the dry dock is in charge of the Grand Trunk Pacific Engineer, Mr. Wm. T. Donnelly, who has drawn the plans and specifications and who will be in charge of the work.

At a recent meeting of the Ottawa Branch of the Canadian Society of Civil Engineers, a resolution was adopted expressing regret at the action of the council "in voting to dispose of practically all the funds of the Society for new headquarters without taking a ballot of the Society on the subject." The point raised was that the various Branches were not getting sufficient funds for their maintenance and progress. Copies of the resolution were forwarded to all the Branches of the Society.

The inaugural meeting of the Victoria branch of the Canadian Society of Civil Engineers was held on the 19th ult., when the following officers were elected for the current year, viz: Chairman, Mr. F. C. Gamble (Chief Engineer of Railways); Secretary-treasurer, Mr. R. W. MacIntyre (Box 1290, Victoria). Amongst others present were Messrs. Bainbridge, Apenes, Rognass, Gray, O'Meara, Evans, Hoard, Hughes and Icke. This branch will include all corporate members, juniors and students residing within a 50-mile radius of the city.

An architectural and engineering exhibition will be held in New York City at the 71st Regiment Armory, Park Ave. and 34th St., from March 25 to 30. Models will be exhibited of buildings in Japan, China, Africa and India, as well as drawings and models of prominent buildings contemplated, or in course of construction, in this country. There will be also exhibits of building supplies, materials and accessories. In connection with the exhibition a conference of architectural, building, contracting and engineering interests will be held. Mr. A. D. V. Storey, 1269 Broadway, New York, is in charge of the exhibition.

The successful tenderers for the proposed High School at Victoria, B. C., who obtained the contract at $280,000, recently withdrew owing to their inability to get any bonding company to give a guarantee for the completion of the work. This, at any rate, was the reason adduced in the notice they sent to the city council. The company put up a bond of ten per cent. and the specifications provided that the city should hold back twenty-five per cent. of the contract price in addition to securing a bond from the contractors. At the last hearing the school architect had recommended to the council that the company's deposit cheque of $14,500 be forfeited.

Advices are received that the new bridge across the Kettle River at First street, Grand Forks, B.C., has been completed and opened for traffic, it being declared to reflect the highest credit upon both the provincial government and the contractor. This bridge has been built to replace one carried away by flood three years ago, and is a substantial structure specially protected against recurrence of the conditions which obliterated its predecessor. The falsework for the new Coquahalla bridge at Hope, B.C., was completed last month, and the work of moving the bridge in sections from the banks of the Fraser has begun. Rumor has it that the C. N. P. will probably decide to span the Thompson River with a bridge at or near Ashcroft, B.C.

It is evident from the recent attitude of Hon. Mr. Monk, at Ottawa, that Vancouver, Victoria and Prince Rupert are to be made national ports, and that everything will be done in the nature of harbor improvements to prepare Vancouver for the shipping development which will follow up the opening of the Panama Canal. Although only half a million dollars has been provided up to the present for harbor works at Vancouver and Victoria, this is only the beginning of the work, and according to Mr. Monk, more money will be forthcoming to carry it on. While on the subject of the Panama Canal it is interesting to note that in Seattle $8,000,000 is being spent on harbor improvements, while in Buenos Ayres they are spending 10,000,000 pounds sterling for the equipment of that port.

Messrs. J. P. Mullarkey, Ltd., Montreal, have received a contract for the construction of a C.N.R. line of 12 miles between St. Eustache and St. Jerome, from which latter point the Canadian Northern has a line running through the Laurentians past Sixteen Island Lake to Huberdeau. People who now desire to get to the Laurentians have to go by C.P.R. to St. Jerome and transfer to the C.N.R. The new line is in connection with the Montreal tunnel and terminal scheme, and will give direct access to the mountains by the shortest route. The line will enter the Island of Montreal over the bridges now being erected at St. Eustache, and from Ile Jesus to the island, and will then come via the tunnel to the central terminals, Montreal. This mountain connection is to be pushed forward so as to come in operation as soon as the terminals are constructed.

The Montreal-Transcontinental Company, capitalized at $3,000,000, and with head office at Montreal, are applying to the Dominion Government for authority to build from Montreal northerly or northwesterly through the counties of Hochelaga, Maisonneuve, Laval, Terrebonne, Two Mountains, Argenteuil, Montcalm, Labelle, Yright or Pontiac, and to connect with the National Transcontinental or the Grand Trunk Pacific at or near Grand Lake, Victoria, in Quebec, or at any other suitable point in the vicinity of the Migiskan River, and thence to James Bay at or near Hannah Bay, with power to operate vessels, docks, and to transmit and deliver electricity. The provisional directors include Messrs. J. A. Vaillancourt, J. E. Vanier, Treffle Bastien, Edward Gohier, F. L. Wanklyn, and Nathaniel Currey, all of Montreal.

Busy times are ahead of the Missisquoi Marble Company, Coristine Building, Montreal, who have obtained contracts valued at more than one million dollars. The contracts in which they are interested are distributed all over the country from Montreal to Vancouver and while they have some of the most important work in the latter cities they have also found excellent opportunities for a large business in central Canada. Notable among their recent contracts are those in connection with the Windsor Station, Montreal; B.C.E.R. Company's building (described in February 28 issue of Contract Record); Empress Hotel extension, Vancouver; Parliament Buildings, Edmonton; Western Trust Company's building, Regina, Sask; Isolation and General Hospitals, Winnipeg, Man.; Fort Garry Hotel and the Post Office at Moose Jaw, Sask.

Details of the organization of the P. Lyall & Sons Construction Company, Limited, are now available. The capital is $4,300,000, of which $1,250,000 is in first mortgage bonds bearing six per cent., $1,300,000 7 per cent. preference stock, and $1,750,000 common stock. The board of directors, in addition to Messrs. Peter Lyall, Wm. Lyall and Trail O. Lyall, include Mr. J. N. Greenshields, K.C., director of La Banque Internationale du Canada; the Hon. Robert MacKay, director of the Bank of Montreal, and Mr. H. Wyndham Beauclerk, director of the National Bridge Company. The statement of the operations of the firm from February 1, 1911, to January 31, 1912, shows net earnings amounting to $234,943.83, an amount which, after providing for the bond interest and payment of preferred stock dividend, would show a surplus of five per cent. on the total common stock of the new company.

Publications Received

The 1912 edition of that popular booklet, "5,000 Facts About Canada" (Canadian Facts Publishing Company, 667 Spadina Avenue, Toronto), is now out. As everybody knows, it presents a wealth of facts and figures concerning the Dominion. The author is Mr. Frank Yeigh, the lecturer.

To the Simplex Concrete Piling Company, Philadelphia, Pa., we are indebted for a comprehensive and excellently illustrated book of photographs and information relating to the Simplex system of concrete piling. The photographs are a revelation of the many practical advantages of the Simplex system. Of these we might mention simplicity and ease of operation, easily reinforced, certainty of results, constant sectional area, greatest frictional surface and equal bulk of concrete for each foot of length. The resultant effects claimed are durability equal to that of natural rock, surpassing carrying power, increased value of soil—due to great compression—and economy in first cost. The various methods developed enable the engineer and contractor to cope with every condition of soil and loading.

Messrs. Mussens Limited, Montreal, dealers in municipal machinery and equipment, have compiled in their 1912 catalogue (No. 41) a valuable compendium of information that cannot fail to be of great value for reference purposes to municipal officials, engineers and contractors. The aim of the catalogue is to present in a concise form the main features of the equipment handled by Messrs. Mussens Limited. Individual catalogues devoted to the various kinds of machinery and supplies are also issued by the firm. Messrs. Mussens Limited are too well known to require any further introduction at our hands and their supplies are too comprehensive, and at the same time too familiar to the contracting interests, to enumerate. Upon application to the various offices of Messrs. Mussens Limited, namely, at Montreal, Toronto, Cobalt, Winnipeg, Vancouver and Calgary, full information pertaining to individual problems are cheerfully given. Of the many interesting features contained in Messrs. Mussens' catalogue specific reference might be made to the Austin reversible road machine. The excellent possibilities of this machine are well set forth in both the illustrations and the text. That the Austin machine is popular in Montreal is evident from the fact that the city is operating twelve of them, in addition to which several are owned by municipalities on the outskirts of the city limits.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Annan, Ont.

Tenders are called until March 25th for stone for roads 1912 supply of limestone and granite, for crushing; for township of Sydenham. Clerk, James Cannon, Annan.

Calgary, Alta.

Tenders are called until March 14th for all sizes salt glazed sewer pipe from 4 in. to 30 in. and junctions. City Engineer, J. T. Child.

Fort William, Ont.

Fort William representatives are trying to get Dominion Government to pay share of Rainy River Valley road making. Minister of Public Works, Dr. Reaume. Government Road Engineer, W. A. McLean. Cost $5,000,000.

Halifax, N.S.

Work will start in spring on erection of concrete sidewalks to cost $4,900, Robie street. Engineer, F. W. W. Doane. Approved by Works Committee. Tenders called about April 1st by Chairman, City Board of Works .

Hamilton, Ont.

3 miles of 10-in. water mains and pressure reducing valves will be laid along Beach Road to supply Saltfleet & Barton Townships with water. Cost $10,000.

Kindersley, Sask.

The by-law has passed to provide for waterworks installation. Cost $50,000. Clerk, D. J. McLeod.

Kitsilano, B.C.

Engineer, F. L. Fellowes, City Engineer, Vancouver, is considering relative cost and qualities of paving. Several large contracts are to be awarded this season.

Tenders are called for Kitsilano main trunk sewer. Also for main, Bridge st. and China Creek sewer. Engineer, F. L. Fellowes, City Engineer, Vancouver.

London, Ont.

The council has applied to legislature for permission to issue debentures for additions to pumping plant apparatus and main extensions. Cost $61,000. Chairman, P. Pocock. Clerk, S. Baker.

Moose Jaw, Sask.

Tenders are called for laying of steel pipe. Clerk, E. B. Bonnell. City Engineer, J. Antonisen. Consulting Engineers, Walter J. Francis & Co., Montreal. Specifications at office of engineers. Received by Clerk until noon, March 18, 1912.

Tenders are called until March 18th for the supply and erection of reinforced concrete reservoir of 2,000,000 gals. capacity. Specifications at office of clerk, or at office of Con. Engineers, Montreal.

Moose Jaw, Sask.

Tenders are called for supply of valves and fittings for water works department. Received by Clerk until noon March 18th. Clerk, E. B. Bonnell· City Engineer, J. Antonisen; Consulting Engineers, Walter J. Francis & Co., Con. Engineer, St. James street. Montreal.

North Vancouver, B.C.

City Engineer, G. S. Hanes, has recommended the macadamizing of St. Davids, Lonsdale avenue, Lynn Valley Road, etc., at an estimated cost of $120,000.

Oak Bay, B.C.

The council of Oak Bay have decided to construct 3000 ft. of sewer easterly from western boundary to be completed by November 30th.

Oshawa, Ont.

Tenders are called until March 11th for brick or asphalt block pavement on concrete base, and with cement concrete curb and gutter approximately 25,000 sq. ft. City Engineer, Frank Chappell, Oshawa. Plans and specifications at Engineer's office.

Regina, Sask.

City Engineer, J. M. Mackay. Tenders will be received by engineer until March 13th for construction of 2722 lineal feet of 60-in. reinforced concrete pipe, 1797 lineal feet of 54-in. reinforced concrete pipe and also trenching for sewer and water pipe for distance of 4419 lineal feet. Plans with engineer.

Toronto, Ont.

Tenders are called until March 12 for construction of sewers on Summerhill avenue, Cairns avenue, Davenport road, west side of Oakwood avenue; Ossington avenue, Davenport road to St. Clair. Chairman, Mayor R. G. Geary.

Vancouver, B.C.

Clerk, W. McQueen. City Engineer, F. C. Fellowes. Board of Works authorized calling of tenders until March 17th for trunk sewer in West Kitsilano.

Board of Works authorized construction of sewers, on Cedar St., Cypress, Robson, Hornby, etc., at an estimated expenditure of $81,360. Clerk, W. McQueen. City Engineer, F. C. Fellowes.

The Board of Works at its last meeting authorized asphalt paving totalling $388,868; brick, $91,344, bitulithic, $105,232; creosoted wood block, $5,956; plank roadways, $4,280.

Welland, Ont.

Tenders are called for construction of pavements to cost $100,000. Mayor, G. Sutherland. Street Commissioner, W. Burgar, Welland. Engineer, J. Black, Welland.

CONTRACTS AWARDED

Hamilton, Ont.

Mayor, Geo. H. Lees; Engineer, A. F. Macallum. Contractor, Dominion Concrete Co., Kemptville, Ont. 1800 ft. 48-in. concrete pipe at $3.20; 1400 ft. 30-in. pipe at $1.35. Pipe to be made in Hamilton.

Saskatoon, Sask.

Pavement, 63,000 yards of the 125,000 square yards to be laid by Bitulithic Paving Company; remainder to be of other kinds of pavement. City Engineer, G. T. Clark. City Commissioners, James Clinkskill. W. H. Neil.

Railways, Bridges and Wharves

Belleville, Ont.

Tenders are called for 4 steel bridges, concrete floors, for County of Hastings. County Engineer, Lucius E. Allan. County Clerk, A. W. Chapman. Plans at office of engineer and at office of Contract Record, 220 King street west, Toronto. Erection of superstructure of 4 bridges one 110-ft. high truss span, one 100-ft. high truss span, one 65-ft. low truss span, one 60-ft. low truss span, one 60-ft. low span, concrete floors. Received by engineer until March 13th.

Berthierville, Que.

Tenders are called until March 19th for construction of a wharf here. Plans may be seen at the secretary's office. Dept. of Public Works. Secretary, R. C. Desrochers, Ottawa.

Calgary, Alta.

The project for bridge to cross river at 14th St. has been referred to commissioners; also widening of Louise bridge which the city engineer estimated would cost $35,000. J. T. Child, engineer.

Edmonton, Alta.

Plans have been submitted to city commissioners for freight shed 400 ft. long, 52 ft. wide, 30 car capacity, team track capacity. 75 cars to be erected between Isabella and Clark streets. Grand Trunk Pacific Railway Co., Montreal. Solicitor for company, J. E. Wallbridge, Edmonton.

Eglinton, Ont.

Tenders are open for the erection of a reinforced concrete bridge to cost $2,500, on Albertus avenue. Engineer, E. A. James.

Elora, Ont.

Elora council favor extension of Berlin & Bridgeport Electric Railway to Elora. W. H. Breethaupt, 56 King W., manager.

Fredericton, N.B.

Grand Trunk Pacific Railway, Montreal, plan a line to Napadoggan, 1st div. pt. west of Moncton, N.B., from here to connect with S. John Valley Railway; distance 45 miles.

Green Point, N.B.

Tenders called until March 18th for construction of a breakwater, Gloucester County. Plans and specifications at office of Dist. Engineer Geoffrey Stead, St. John, N.B. Dept. of Public Works, Ottawa. Secretary, R. C. Desrochers.

Halifax, N.S.

Plans are drawn for new station and freight sheds, Hollis & Grenville sts., for Intercolonial Railway Co., Halifax, and Dominion Atlantic Ry. Co., Halifax. Plans prepared by railways show extensive scheme of railway yards, terminals, bridges, freight sheds, and union station. Plans involves subways and grading of streets. Also alterations to docks and removal of old buildings.

London, Ont.

Tenders will shortly be called for the erection of a bridge to cost about $20,000. City Clerk, S. Baker.

Milton, Ont.

Tenders are called for reinforced concrete arch bridge. Received by clerk until March 7th. Span 135 ft., viaduct approaches 340 ft. Engineer, Frank Barber, 57 Adelaide street, Toronto. Clerk, Wm. Painter, Milton.

Nelson, B.C.

Tenders are called for reconstruction of bridges, stone walls for bridges, 64.9 and 65.0 and stone piers for 92.3. Received by S. Moss, engineer, until Mar. 15th. For Canadian Pacific Railway.

New Westminster, B.C.

The city has in view an extensive scheme of harbor improvements and railroad entrys. John A. Lee, Mayor.

International Railway & Development Co., Vancouver, secretary-treasurer, H. T. Thrift, Hazelmere, plan to build an electric railway, 190 miles long, from Ladner, B.C., to Seattle. Power plant capable of developing 500,000 h.p. to be built.

Saskatoon, Sask.

Plans are filed by C.P.R. for railroad extension from Wilkie to Fort McMurray. This road to open up Peace River country.

Toronto, Ont.

Preliminary plans have been prepared for Toronto to Guelph radial. Owners, Mackenzie & Mann, Toronto. President, Sir William Mackenzie, and W. H. Moore, representative. Company states that appropriation for proposed road is made and that work will proceed this summer. Route of line, Toronto, Cooksville, Brampton, Georgetown, Acton, Eden Mills, Guelph.

The Toronto Suburban Railway Co. are petitioning the Ontario Government for powers to construct a line from a point in its Toronto-Hamilton line in Peel county to Brampton, then easterly and southerly back to Davenport.

Vancouver, B.C.

Railroad extensions and terminals to cost $2,000,000 will be built for Canadian Pacific Railway Co. Vice-president, George J. Bury, manager of western lines. New station and office building in Vancouver. New overhead bridge and jetty wharf. Vancouver. Double tracking between Hammond and Vancouver.

Wallaceburg, Ont.

Tenders will be received by J. A. Bell & Son, engineers, St. Thomas, for construction of a concrete bridge. Mayor, C. Sauvey, Wallaceburg. Four 25-ft. reinforced concrete arches with 4 stone abutments replacing old bridge at Wallaceburg.

Weyburn, Sask.

Grand Trunk Pacific Railway, Montreal, will begin survey on two projected lines from Cedoux through Weyburn to international boundary and from Weyburn to Lethbridge, etc. As soon as assent of Provincial Legislature has been obtained work will begin. Address Sec. Board of Trade, Weyburn, Sask.

CONTRACTS AWARDED

Montreal, Que.

The Foundation Co. Ltd., 76 Bank of Ottawa Bldg., Montreal, Que., have been awarded the contract to construct a dam and small bridge, about five miles from Bankhead, Alta., on the Cascades River. Work will commence at once.

Suffield, Alta.

Railway construction, branch from main line, for Canadian Pacific Railway Co., Winnipeg. Contractor, J. G. Hargrave & Co., Ltd., 334 Main street, Winnipeg. Earthworks, embankments, etc.

Public Buildings, Churches, Schools, etc.

Athens, Ont.

Athens High School Board, Trustees, Thompson, Charleston Lake, Ont., and Alquire, Athens, Ont. Work will start this spring on the erection of a new High School to cost $10,000.

Belleville, Ont.

The Ontario Provincial Government, Treasurer, Hon. A. J. Matheson, Toronto, plan to build new buildings for the Deaf and Dumb Institute at a cost of $65,000.

Additions to the Hospital for Feeble Minded to cost $20,000 are provided for in the Provincial Government estimates. Treasurer, Hon. A. J. Matheson, Toronto.

Berlin, Ont.

The Shantz farm has been purchased and a tuberculosis hospital will be erected. Mayor, W. H. Schmolz.

Brantford, Ont.

Ontario Provincial Gov't; Treasurer, Hon. A. J. Matheson, provided in their estimates for the expenditure of $65,000 in erecting new dormitory buildings at the Institution for the Blind.

The Alexander Presbyterian Church; representative, A. L. Baird, K.C., Brantford. Architect, J. Wilson Gray, Confederation Life Bldg., Toronto, are planning addition to Sunday School, 56 ft. x 70 ft., on Colborne street, to cost $25,000.

Calgary, Alta.

Tenders are called for 2 schools to cost $135,000, for Calgary School Board, Calgary. Architect, Mr. McLellan, City Hall. Two-storey, brick, stone, concrete, concrete foundation, steam heating, electric lighting, slate roofing, oak interior finish.

Sketch plans are invited for a 2-stall fire police station at Crescent Heights, $10,000; branch police stations at Bankview and East Calgary, $5,000.

Tenders are open until May 1 for Anglican church to cost $20,000. Architect, Leo. Dowler, Calgary. Brick and stone construction, concrete foundation.

Sketch plans are invited for smallpox hospital to be erected on a site to be decided by council.

The City of Calgary Commissioners will recommend a new Police Station near City Hall to cost $100,000.

The Calgary County Orange Club at a meeting on the 19th ult. decided to build a new Hall. A joint stock company will be formed.

J. T. Child, City Engineer, is preparing plans for number of public lavatories throughout the city.

Galt, Ont.

George Dobie & A. M. Edwards, Galt, have petitioned the Government for new armouries to be erected here.

Hamilton, Ont.

Plans are being prepared for motion picture theatre and stores to cost $10,000, corner Barton and Leeming streets, for Guest & Simons, 12 Garth street E. Architect, Stewart & Witton, 2 Hughson street S. Stores on either side, apartments above; seating, electric fixtures, picture machines and equipment required.

London, Ont.

Tenders will be called shortly for public station and weigh scales to cost $6,000. City Clerk, S. Baker.

Plans will be prepared for addition to hospital to cost $13,000, for Victoria Hospital Trust. Architect, City Architect Nutter. Chairman, Col. W. N. Gartshore. Complete new equipment, beds, electric light, steam radiators, etc., will be required.

Montreal, Que.

Council passed motion recommending installation of a refrigerating plant at a cost of $25,000.

The Board of Control are considering erection of civic library. City Clerk, L. O. David.

Tenders are called for erection of a motion picture theatre, Notre Dame near Charlevoix st., for Duchess Amusement Co. Architect, Dufort & Decary, La Patrie Bldg., Montreal. Three-storey, 66 x 110, brick, terra cotta trim, columns and arches, masonry foundation, gas & electric lighting, tar and gravel on plank roofing, marquise in architectural iron and glass, iron staircase, hardwood finish, concrete flooring with mushroom reinforcement resting on concrete piers, auditorium to seat 1400; galleries, boxes, railings.

Tenders will be called and work will commence shortly on the erection of an annex to City Hall. Clerk, L. O. David. Architects, Marchand & Haskell, 164 St. James street, Montreal. Plans and specifications almost ready.

Napanee, Ont.

Plans have been prepared for covered skating rink to cost $9,000. Architect,

A. Ellis, Kingston. Steel roof, cement block walls. Plans with C. W. Warner, Napanee.

Plans are being prepared for remodelling town hall and market. New front to hall; covered market in rear. Expenditure about $8,000.

New Westminster, B.C.
Tenders will be called after March 18th for high school to cost $100,000. Architect, Gardiner & Mercer, New Westminster. Three-storey, brick and terra cotta, concrete foundation, electric lighting, fan system of heating, slate roof, fir interior finish.

Tenders will be called after Mar. 11. for school to cost $45,000, 7th ave. Architects, Gardiner & Mercer, New Westminster, B.C. Three-storey, brick and frame, concrete foundation, electric lighting, fan system of heating, shingle roof.

Tenders will be called in about a week for theatre and office building to cost $150,000, for Peoples Trust Co. Architect, Gardiner & Mercer. Eight-storey, 64 x 132, reinforced concrete and steel, electric lighting, heating system not settled; terra cotta, vaults, theatrical equipment, seating capacity $1450. Working drawings being prepared.

North Vancouver, B.C.
A site has been presented for erection of a church on 10th and St. George's ave., for St. Andrew's Presbyterian Congregation. Architect, Alexander & Brown, Fairfield Building, Vancouver. Frame, 66 x 140. Work will start shortly.

Ottawa, Ont.
Tenders will be called shortly for a church to cost $90,000 for Bank street Presbyterian Congregation. Chairman Building Committee, Rev. J. H. Turnbull, 543 Gilmaur avenue, Ottawa. Architect, Hutchinson, Wood & Miller, Royal Insurance Building, Montreal.

Pincher Creek, Alta.
A by-law will be submitted to raise $15,000 to provide for the erection of a new Town Hall. Clerk, G. D. Plunkett.

Prince Rupert, B.C.
The city has donated the site and Dominion Government will spend $75,000 on the erection of a new Drill Hall. City Engineer, W. M. Davis.

River Glade, N.B.
Tenders are called until March 12th for Sanitarium buildings, for Jordan Sanitarium Commission. President, J. K. Flemming, River Glade, N.B. Architect, F. Neil Brody, 42 Princess st., St. John, N.B. Plans may be seen at Public Works Department, Fredericton, and at office of F. W. Summer, Moncton, N.B. Tenders received for erection and completion of three pavilions, and for heating administration building of Jordan Sanitarium.

St. Andrews, N.B.
Tenders are called for erection of a new school. Architect, F. Neill Brodie, 42 Princess street, St. John, N.B. Received by Secretary, D. C. Rollins, until March 12th. Plans with architect.

Stratford, Ont.
Plans will be prepared for erection of new Salvation Army Barracks. Secretary, J. A. Fletcher. Architect, Major Miller, Toronto.

Toronto, Ont.
Tenders will be called shortly for a fire hall, police station to cost $40,000, Exhibition Grounds, for Canadian National Exhibition Association, City Hall, Toronto. Architect, Geo. W. Gouinlock, 1108 Temple Bldg. Brick, stone trimmings. Building to be ready this fall.

Plans are in progress for new Y.M.C.A. to cost $1,000,000, for University of Toronto. Architect, Sproatt & Rolph, 99 Yonge street, Toronto. Details later.

Vancouver, B.C.
Excavation has started for an 8-room school, Lakewood Drive and Broadway, for City of Vancouver Board of Education. Secretary, C. W. Murray. School Architect, N. A. Leech. Appropriation of $57,000 is in estimates for 1912.

Plans are being prepared for theatre to cost $750,000, cor. Georgia and Burrard street, for Vancouver Opera House, Vancouver. Manager, E. R. Rickett, Vancouver. Building to be finest and best equipped on Pacific Coast.

The Vancouver Athletic Club, 901 Hastings street, Vancouver, are calling for tenders for disposal of present building and have decided to advertise for a suitable site for erection of a new club house.

Vernon, B.C.
City Clerk, D. G. Tate. Lotz & McRae of Medicine Hat, Alta., have purchased a site on Barnard avenue for the erection of first-class theatre to cost $40,000.

Victoria, B.C.
The Board of Education will erect a new High School. The Islander Construction Co. has thrown up contract, which was $45,000 below other tenders and arrangements are being made for calling new tenders.

Welland, Ont.
A site has been secured for erection of a high school. Mayor, G. Sutherland.

Weston, Ont.
Tenders are open for addition to sanitarium to cost $6,00, for National Sanitarium to cost $6,000, for National Sani- Dennison, 20 King street west, Toronto. Brick, concrete foundation, electric ltg., steam heating, structural steel, cut or art stone, fire escapes, hardwood finish, galvanized cornice.

Windsor, Ont.
Plans are being prepared for Separate School to cost $35,000, on Park st. President, Gaspard Pacaud, Windsor. Secretary, D. Gourd, Windsor. Architect, Jacques & Co., Windsor. Two-storey and basement, brick, stone and concrete, concrete foundation, electric lighting, steam heating, steam heating, prepared roofing, Georgia pine finish, boiler, 8-room school, equipment, desks. Tenders called about March 1st by Architect.

Winnipeg, Man.
A by-law will be submitted to provide for new City Hall. Secretary Board of Control, M. Peterson, Winnipeg. By-laws to be submitted in June. Site, present market and City Hall. Architects to submit competitive plans.

CONTRACTS AWARDED

Calgary, Alta.
Church to cost $400,000, 6th avenue west, for Trustees Knox Presbyterian Church, Calgary. Architect, J. F. Lawson, Norman Block, Calgary. Substructure Contractor, Walker Fysche Co., Calgary. Superstructure Contractors, Fysche Martin Co., Calgary, $183,000. New pipe organ to be purchased; also all fittings and furnishings. Work to be finished in one year.

Incinerator plant to cost $49,600. City Engineer, J. T. Child, City Hall. Contractors, Laurie & Lamb, Montreal.

Moose Jaw, Sask.
College and Residence. Owner, Saskatchewan College Board of Governors. Architect, R. G. Bunyard, Room 6, Bk. of Commerce Bldg., Moose Jaw. Contractor, Claydon Bros., Winnipeg, Man. Work to start in spring.

Point Grey, B.C.
Work has started on convent to cost $300,000, for Sisters of the Sacred Heart. Architect, Chas. G. Badgley, Seattle. Builder, S. J. Luna, Empire Bldg., Vancouver. Work to start in April. Contractor not yet ready for estimates.

Red Deer, Alta.
Some contracts are let for college to cost $125,000, for Presbyterian Ladies College. Architect, Barnes & Gibbs, Edmonton, Alta. Chairman Building Committee, John Malcolm, Red Deer. Excavation, T. Goodmanson, Red Deer Steel work, Manitoba Iron Works. Further details later—Committee to decide on plans. 3½-storey, brick and terra cotta, concrete foundation, electric ltg., steam heating, shingle roof.

Revelstoke, B.C.
Court House. Architect, Thos. Hooper, Winch Bldg., Vancouver. Contractor, Ritchie Contracting & Supply Co., Vancouver.

Victoria, B.C.
Mortuary Chapel, on Broughton st., for British Columbia Funeral Furnishings Co., Victoria. Interested, Chas. Hayward, Victoria. Contractors, Thos. Cotterall Co., Ltd. Two-storey, brick, terra cotta, marble, hot water heating, tar and gravel roof, leaded glass, concrete. Work to start at once.

Windsor, Ont.
The Board of Education of this city, at a special meeting held last evening, awarded the contracts for the construction of the new school as follows: Thompson Bros., mason work, 26 Pitt street west; Euclid Jacques, carpenter work, 87 Assumption street; John P. Reid, lathing and plastering, 148 Goyeau street; Lossing & Harris, painting and glazing, 27 Pitt street east; Thos. Blackburn, galvanized iron and tinning, 36 Pitt street west; Windsor Hardware Co., heating, 71 Sandwich street east; James Clark, electric wiring, 41 Elliott street. Alex. Black, secretary-treasurer.

Wolfville, N.S.
Library and Manual Training School, for Acadia University, Wolfville. President, Dr. G. B. Cutten, Wolfville. Library $25,000, manual training school $10-000. The Canada Car Company, Amherst, N.S., have been awarded contract for manual training school.

Residences

Calgary, Alta.

Plans have been prepared for residence to cost $4,000, Hillhurst, for W. McDougall, 924 14th avenue west. Two-storey, 26 x 36. frame, concrete foundation, electric light, hot air heating, shingle roofing.

Tenders are called for residence to cost $12,000, for Mr. Clouston. Architect, Leo Dowler. 2½-storey, brick veneer, concrete foundation, electric lighting.

A permit has been granted for residence to cost $4,000, for Brown & Taylor, Box 1645. Two-storey, 30 x 30, frame, concrete foundation, hot water heating, electric lighting, shingle roofing, hardwood interior finish.

Plans are prepared for residence to cost $4,000, Sunnyside, for R. F. Sanderson, 938 1st avenue N.W. Calgary. Two-storey, 26 x 34, frame, concrete foundation, electric light, hot air heating, shingle roof, hardwood finish.

Maisonneuve, Que.

Work will commence shortly on five flats to cost $4,500, Letourneau avenue, for J. A. Geuest, 452 Letourneau ave., Maisonneuve. Three storeys, 25 x 43, brick, concrete foundation, stove heating, gravel roofing.

Montreal, Que.

Plans are prepared for residence to cost $15,000, Edgehill avenue, for A. Racine, 340 St. Paul street. Architect, Dufort & Decarie, La Patrie Bldg. Brick, first floor half timber and stucco, hardwood finish, hot water heating, gas and electric, slate roof.

Plans have been prepared for cottage to cost $3,500, cor. Minto ave. and Cote St. Antoine, for J. A. Drapeau, 38 Cazelais st., Montreal. Architect, R. Charbonneau, 52 St. James street, Montreal. 2-storey, 30 x 55, brick veneer, gas and electric lighting, gravel roof. Tenders received by owner at once.

Plans are prepared for 13 apartments to cost $12,000, Sherbrooke and St. Chas. Borromee sts., for J. H. Maher, 160 St. James street, Montreal. 4-storey, 55 x 115, brick, concrete foundation, electric light, hot water heating, gravel roofing, dumb-waiter.

Oakville, Ont.

Tenders are open for pair residences to cost $7,000, for T. Thornton. Architect, Mallory & Thatcher, Queen street, west, Toronto.

Ottawa, Ont.

A permit has been granted for apartments to cost $6,000, Waverly street, for J. P. Band, 365 Frank street, Ottawa. Solid brick. Alterations and additions to apartments. Owner is builder.

Saskatoon, Sask.

S. K. Clotworthy is planning to erect an apartment block to cost $20,000, cor. Dufferin and Main streets. Architect, David Webster, Saskatoon. Two-storey, red brick, 8 apartments, balconies, laundry, up-to-date fixtures. Work will start in the spring.

Toronto, Ont.

Plans are completed for pair residences to cost $8,000, Glen road, for R. B. Storey, 38 Marmaduke street. Brick, shingle roofing.

Plans are being prepared for apartment house to cost $25,000, 73 Baldwin street, for Saml. Yollis, 244 Simcoe st., Toronto. Architect, T. S. Yollis 244 Simcoe street, Toronto. Tar and gravel roofing, steam heating, cut and art stone, mantles and tiles, stucco, 2 storeys and bosement.

Plans are being prepared for apartment block to cost $50,000, Jarvis St., near Maitland street, for Wm. Booth & Sons, 44 Grove avenue. Six-storey, brick, art stone trimmings, mantles, tiles, hardwood finish, steam heating, tar and gravel roofing, combination lighting.

Tenders are open for residence to cost $3,700, Summerhill avenue, for Mr. Babbington, 101 Summerhill avenue. Architect, O. Maynard, 481 Delaware avenue; 2½ storeys, brick.

A permit has been granted for residence to cost $4,000, E.S. Pauline St., near Wallace street, for T. J. Pattullo, 221 Howard Park avenue. Pair semi-detached, solid brick, shingle roofing.

Plans are contemplated for four pair houses to cost $20,000, Lansdowne ave. for C. Lurie, 105 Denison avenue, Toronto. Architect, J. Gladwin Hedges, 86 Clinton street. Two-storey, solid brick, stone foundation, hot air heating, combination lighting, cut or art stone, tiles, mantles, stucco, plate glass, slate roofing.

Tenders are open for 3 attached dwellings, to cost $7,500, Lot 1, Boston ave., for Jno. Lutz, 512 King west. Architect, Len Foulds, 21 Leader Lane. Brick, shingle roofing, 2 storeys.

Tenders are open for residence to cost $5,000, Avenue road and Lyndwood road, for W. S. Grimshaw, 456 Avenue road, Toronto. Architect, J. H. Galloway, 23 Toronto street, Toronto. 2½ storeys, brick, stone foundation, combination lighting, hot water heating, mantles and tiles, oak finish.

Tenders are open for 9 pair dwellings to cost $45,000, Medland street near Humberside avenue, for Hamilton Milligan, 642 Annette street. Architect, F. Waite, 11 Annette street. Two-storey, semi-detached, brick, stone foundation, tar and gravel roofing.

Tenders are open for alterations and addition to apartments to cost $6,000, Church street, for J. M. Cowan, 762 St. Hubert street. Architect, J. M. Cowan, 63 Adelaide E. Brick, tar and gravel roofing, steam heating, electric lighting, mantles and tiles, ornamental iron, gas stoves, refrigerators, carpentry.

Tenders are open for 4 private residences to cost $15,000, Pleasant avenue, for Alfred W. Reid, 104 Admiral road. Architect, J. H. Galloway, 23 Toronto street, Toronto. Brick, 2 detached and 2 semi-detached, hot water heating, hardwood floors, stucco, shingle roofing.

Plans are completed for apartment house to cost $35,000, St. Clair ave. and Oriole road, for Thomas McIlwain, 147 Jameson avenue, Toronto. Architect, Edwards & Saunders, 18 Toronto street, Toronto Brick, stone foundation, slate roof, hot water heating, electric lighting, art stone, mantles and tiles, pine finish, plate and art glass, concrete; 3 storeys

Plans are completed for pair residences to cost $6,000, Conduit street, for I. Bordman, 108 Queen west. Architect, J. H. Galloway, 23 Toronto street. Toronto. Semi-detached. brick, shingle roofing, hot water heating, combination lighting, Georgia pine interior finish, 4 mantles.

Plans have been drawn for apartments to cost $18,000, King street and Jamieson avenue, for S. King, 185 Spadina avenue. Architect, Len Foulds, Leader Lane, Toronto. 3-storey and basement, brick, stone foundation, tar and gravel roofing, structural steel, sky-lights, art stone, galvanized cornice, mantles, tiles, chimney pots, sidewalk lights, verandahs, hardwood finish.

Tenders are open for 2 residences to cost $7,000, Nina and St. Clair, for Arthur A. Hobson, 70 Hilton avenue; two storeys and attic.

A permit has been issued to erect pr. residences to cost $5,000, Empire avenue, for E. Benner, 155 Booth avenue. Two-storey, semi-detached, brick veneer front, roughcast sides.

Tenders are open for an apartment house to cost $15,000, E. Side Bellwoods avenue near Robinson street, for Chas. Proctor, 38 Melbourne avenue. Tar & gravel roofing, 2 storeys and basement.

Vancouver, B.C.

A permit has been granted for apartment house to cost $60,000, 621 7th avenue east, for R. J. Coleman, 135 Hastings street west, Vancouver. Three-storey, 50 x 120, hot water heating.

Plans are being prepared for residence to cost $10,000, Shaughnessy Heights, for George Ingram, 336 Pender street E., Vancouver. Architect. J. H. Bowman, Crown Bldg., Vancouver. 2½- sty. and basement, stone or concrete, hardwood floors and trimming, five bathrooms, conservatory.

Plans are prepared for residence to cost $30,000, Shaughnessy Heights. Architects, Parr, McKenzie & Day, 570 Granville street, Vancouver. 2½-sty., stone and frame, 14 rooms, steam heating, 4 bath rooms, fireplaces, billiard room. Tenders expected to be called this week from selected contractors only.

Victoria, B.C.

Tenders are called for store and apartments for George Bell. Architect, Thos. Hooper, 1108 Government street, Victoria, B.C. Two storeys, 60 x 120, brick, Heating contract probably called separately.

Westmount, Que.

Plans are being prepared for pr. semi-detached residences, Westmount Blvd., for A. Racine, 340 St. Paul street, Montreal. Architect, Dufort & Decarie, La Patrie Bldg., Montreal. Details later.

Windsor, Ont.

Sketches have been prepared for addition to residence to cost $3,000, on Victoria street, for E. G. Henderson, Windsor. Architect, Stahl & Kinsey, Walkerville. Brick veneer, new plumbing & heating.

Winnipeg, Man.

Plans are prepared for apartments on Toronto street, for S. Anderson, 651 Bannatyne avenue. Architect, Paul M. Clemens, 331 Garry street. 3-storey, solid brick, stone foundation, electric lighting, steam heating, tar and gravel roofing, hardwood finish.

Tenders will be called for apartments,

Winnipeg avenue, for A. Johnston & S. Palmerston, 414 Maryland street, Winnipeg. Architect, Paul M. Clemens, 331 Garry street, Winnipeg. Three-storey, 46 x 90, solid brick, stone foundation, electric lighting, steam heating, gravel roofing, hardwood finish

CONTRACTS AWARDED

Calgary, Alta

Two residences to cost $5,000, Elboya street, for Mr. Van Delinder, Room 12, Alexander Corner. Contractor, W. S. McDonald, Box 1157, Calgary. Two-storey, 22 x 34, frame, concrete foundation, electric lighting, hot air heating, shingle roof, hardwood floor.

C. H. Wells, 19 Alexander Corner, has applied for a permit to erect a new residence. Two-storey, 36 x 40, frame, concrete foundation, hot water heating, electric lighting, shingle roofing, hardwood interior finish, vacuum cleaner. Owner is builder.

Two residences to cost $3,000, Royal Sunalta, for P. H. Allen, 7th avenue west. Contractors, Canadian Home Building Co., 218 8th avenue west. 2-storey, 20 x 36, frame, concrete foundation, hot air heating, electric lighting, shingle roofing, hardwood interior finish.

A permit has been granted for residence to cost $5,000, Elboya street, for M. McAlister, Guelph, Ont. Contractor, J. C. Major, 2219 18A street west, Calgary. Two-storey, 34 x 36, frame, concrete foundation, electric lighting, steam heating, shingle roofing, hardwood finish.

Montreal, Que.

Residence and stable, Mountain st., Redpath property, for C. E. Gudewill, 317 Pine avenue. Architect, Brown & Vallance, 189 St. James street. Electric lighting, Collyer & Brock, 131 St. Alexander street. Plastering, W. J. Cook, 11 Concord street. Masonry, J. H. Hutchinson, 64 St. Ambroise street. Carpentry, Geo. Roberts, 79 Lagauchetiere street. Painting and glazing, Murphy & Son, 140 Mansfield street. Tiling, G. R. Locker Co., 143 Mansfield street. Roofing, Geo. W. Reid Co. Ltd., 37 St. Antoine street. Three storeys & basement, 36 x 75, brick and sandstone trimming; granite base, concrete foundation, electric lighting, steam heating, copper roof, hardwood and tile interior finish. Tenders were received privately by architect.

Three Flats to cost $4,500, Garnier street, for N. Dandenault, 869 Sanguinet street. Contractor, Eugene Dusseault, 85 DeLanaudiere street, Montreal. 3-storey, 25 x 45, brick, stone foundation, gravel roofing.

Apartments to cost $75,000, Berthelet street, for J. S. Evans, Bank of Ottawa Bldg., Montreal. Architects, Finley & Spence, Beaver Hall Hill. General contractor, Bishop Construction Co., Eastern Townships Bank Bldg. Granite, Laurentian Granite Co., 224 St. James street. Plumbing and heating, T. O'Connell, 183 Ottawa street. Millwork, V. E. Traversy, 15 Josephat Lane.

Six flats, to cost $6,000, City Hall ave., for Brazer & Caplain, 348 Bleury street. Contractor, M. Caplain, 88a Chenneville street. Three-storey, 36 x 60, artificial stone, stone foundation, gas and electric light, gravel roofing. Foundation in.

Four flats to cost $12,000, Victoria street, Mt. Royal Ward, for Hamilton Patton, 19 Balmoral street. Architect, Joseph Sawyer, 407 Guy street. General contractor, A. Lacroix, St. Lambert. Two-storey, 50 x 70, stone and pressed brick, concrete foundation, gas and electric lighting, furnace heating, gravel roof. Foundations are in.

Ottawa, Ont.

A permit has been granted for residence to cost $3,500, on Bell street, for Geo. Johnston, 14 Chamberlain street, Ottawa. Double brick veneer, 33 x 36, concrete foundation, electric lighting. Owner is builder.

K. Cohen. 140 Nelson street, has taken out a permit to erect a residence to cost $3,500, Archibald street. Two-sty., 30 x 45, double brick veneer, concrete foundation, electric lighting. Owner is builder.

Toronto, Ont.

Three pair residences to cost $12,000, Pape avenue near Danforth, for Jno. S. Wren, 16 Victor. J. A. Taylor, 132 Riverdale avenue, Toronto. Semi-detached brick, rough cast sides, hot air heating, electric lighting, tar and gravel roofing. Owner is builder.

Two pair residences to cost $8,000, N. W. corner Pine and Silver Birch ave., for M. Howell, Queen street and Beach avenue. Builder, F. J. Cornell, 12 Heyworth avenue. Semi-detached, brick.

Residence to cost $4,500, S.S. Fairview Blvd., for E. W. Bruce, 466 Gladstone avenue. Builder, Eagle & Smith.

Residence to cost $8,000, Russell Hill Rrive, for F. H. Russil, Madison Apartments. Architect, F. S. Baker, Traders Bank. Masonry, T. W. Hall, Eglinton, Ont. 2½-sty., brick and half timber.

Residence to cost $11,000, 72 Dunvegan road, for S. R. Hanna, 114 Charles street west. Architect, W. R. Gregg, 23 Jordan street. Builders, Self Bros., 78 Howard street. 2½-sty.. detached, brick, stone foundation, hot water heating, art stone, galvanized cornice, slate roofing.

A permit has been issued to erect a residence to cost $4,500, Playfair Crescent and Hutchison avenue, for D. B. Binell, 105 Booth avenue. Builder, A. Beckton, Toronto.

Vancouver, B.C.

A contract is awarded for 7 bungalows to cost $1,800 each, Gravely street and 2nd avenue east, for Dominion Land & Financial Corp., Fairfield Lldg., Vancouver; to Contractor A. O. Knight, 1737 13th avenue E. One-storey, hot air heating. General contractor will handle all minor contracts.

Warrell, Ont.

Residence to cost $4,000, for Wm. McNeilage. Architect, J. L. Wilson. Two-storey, 30 x 40, solid brick, concrete foundation, hot air heating, shingle roof, oak and Georgia pine. Contractors, Sparks Bros., Chatham. Painting and glazing, Wm. Palmer, Catham. Hardware, L. Callahan, Chatham.

Westmount, Que.

The steel contract is awarded for residence for J. M. Fraser, 4378 Western avenue. Architects, Hutchinson, Wood & Miller, Royal Insurance Bldg., Montreal. To the Dominion Bridge Co., Lachine.

Residence to cost $18,000, Metcalfe street, for Leopold Rodier, 344 Mountain street. Montreal. Architect, W. A. Gagnon, 46 Beaver Hall Hill. General contractor, Theodule Lessard & Son, 210 Park avenue, Montreal. Tenders received by contractor, 2 storeys and attic, 34 x 74, brick, stone trimmings, concrete and rubble foundation, electric lighting, slate roof, furnace heating, stable, $3,000, 40 x 22, brick, stone foundation, galvanized iron.

Winnipeg, Man.

Residence to cost $5,000, Oakwood avenue, for Robert Wood, 351 Notre Dame avenue. Architect, Edgar Prain, 313 Fort street. Contractor, Daykin-Scott Construction Co., 253 Princess street. Contractors have letting of heating, lighting, painting and sub-contracts.

Residence to cost $3,800, Sanborn St., for B. A. Dugal, Sherbrooke. Contractor, A. Jones & Co., Sherbrooke. Two-storey, 52 x 30, wood, concrete foundation, electric lighting, hot water heating, gravel roofing.

Business Buildings and Industrial Plants

Bassano, Alta.

G. T. Watson, jeweller. Winnipeg. c/o Watson-Sterling Co., 350 Portage ave., Winnipeg, will build a 4-storey business block on 2nd avenue.

Blairmore, Alta.

The Blairmore Brick Co., Ltd., are planning to make additions and improvements, increasing capacity of their plant from 40,000 to 80,000 bricks per day.

Calgary, Alta.

Plans are being prepared for stores and apartments to cost $12,000, for J. R. Irwin, 520 10th street west. Business block of stores and apartments similar in construction to one built last year on Sunnyside.

J. W. Chittick, 11th street west, is planning to erect stores and apartments on 14th avenue and 11th street west, at a cost of $15,000. Two-storey, 50 x 60, brick veneer.

H. Brown, 1619 35th street, N.W. Calgary, has applied for permit to erect stores, 2-storey, 30 x 50, frame, concrete foundation, hot air heating, electric lighting, tar and gravel roofing. Cost $3,000.

Ontario & Manitoba Flour Co. are contemplating the erection of a flour mill. J. R. Ness is expected here in regard to a site.

Edmonton, Alta.

Plans are prepared for business block. Fourth avenue and Peace, for Campbell Bros. & Wilkinson, wholesale grocers, Princess and Bannatyne streets, Winnipeg, Man. Address, F. T. Fisher, Secretary Board of Trade, Edmonton.

Edson, Alta.

Plans have been prepared for cement works to cost $600,000, plant at Marlboro, for Portland Cement Co.. Edson, Alta. Complete cement working machinery to be installed. Excavation has commenced.

Findlater, Sask.

Plans are being prepared by Architects, Storey & Van Egmond, Regina.

Sask., for the erection of a new hotel here on the C.N.R.

Fonthill, Ont.

Tenders will be called shortly for the erection of a canning factory for Dominion Canners, Ltd., Hamilton. General Manager, Mr. Nairn. Two-storey. 170 x 40, and 150 x 140, brick, stone foundation, boiler and modern canning equipment.

Halifax, N.S.

Messrs. Clayton will build a business block. Drug store and ticket office on ground floor; apartments above.

Hamilton, Ont.

The United States Wood Preserving Co., New York, U.S.A., are looking for building site of 30 acres on which to erect large plant.

Negotiations have been reopened for steel works to cost $60.000. Representative of company. David A. McIlroy, Mountain Park avenue, Hamilton, is trying to purchase site on Hottridge street.

The Fretz Co., Ltd.. Vineland, Ont., President, C. Fretz. Vineland, will erect two canning factory buildings 84 x 56, brick, concrete and steel construction costing $8,000 each; cor. Barton and Belleview avenue.

Tenders will be called shortly for plumbing and heating for 3-storey building, Hughson and Jackson streets, for Standard Chemical Co., Ltd., Hamilton Manager, Hugh S. Wallace, Hamilton. Architects, Stewart & Witton, 2 Hughson street. Hamilton.

Edward Pollard, Vermont, Va., is looking for suitable site to locate a foundry here.

Montreal, Que.

Plans have been changed for alterations to building to cost $10,000, 23 Phillips square, for J. H. Maher, 160 St. James street, Montreal. Architect. Cox & Amos, 112 Mansfield street, Montreal. 2½-sty., 80 x 120, cut stone, electric lighting., iron and glass roof. Altering old art gallery into offices and theatre, new stores, new entrance, etc. Tenders received by architect.

Plans are being prepared for Hall, Offices and Stores to cost $30,000, on Notre Dame west, for Union St. Joseph De St. Henri, 1887 Notre Dame street W., Montreal. Architect. R. Charbonneau, 52 St. James street. 4-storey, 45 x 100, stone and brick. steel frame, stone foundation, gas and electric lighting, hot water heating, gravel roof, hardwood trim, terra cotta partition, modern plumbing, fireproof vaults, fire escapes, 2 storeys in front. Tenders called in about a month.

Plans are prepared for 5 stores and 4 apartments to cost $33,000, Park ave. and Bernard streets, for De Boucherville & Lalonde, 1042 Dorchester street W. Architect. Dufort & Decary, La Patrie Bldg., Montreal. 3-storey and basement, 50 x 100, brick with Indiana limestone trimmings, masonry foundation, gas and electric lighting, hot water heating, gravel roofing, architectural iron, steel frame, English style of architecture. Tenders received by architect after March 10, 1912.

A. P. Cuman Shoe Mfg. Co., Ltd., 322 Papineau avenue, Montreal, plan to erect a shoe factory on De Fleurimont avenue this summer. Architect, C. A. Reeves, St. James street, Montreal. Solid brick, 45 x 150, 3 storeys and basement. Tenders are in and contract will be awarded in a few days.

Nelson, B.C.

Hodgson, Bates & Butler, architects, of Calgary, Alta., will shortly call for tenders for the erection of a three-sty. brick store and office block, on Baker street to cost $40,000.

W. C. Wells, proprietor of The Hume Hotel, is having plans prepared for a 3-storey annex on site adjoining the present building to cost $16,000.

New Westminster, B.C.

B. C. Securities Co. will build an 8-storey office building, cor. Columbia ave. and Sixth street, 66 x 132 ft. Building to be partly occupied by Dominion Trust Company.

Niagara Falls, Ont.

Niagara Falls Linen Co., Manager, A. F. McIntyre, have acquired a site of two acres. It is stated construction will shortly begin on a linen factory to cost $50,000.

Port Colborne, Ont.

The Lake of the Woods Milling Co., St. Sacrament St., Montreal, intend locating flour mills here.

Princeton, B.C.

W. B. Swanson will erect a large hotel, cost $35,000. Three storeys. 200 x 200, brick or cement blocks, concrete foundation, steam heating, electric lighting, felt roofing, interior finish, B. C. Fir, electric wiring and fixtures.

Plans are being prepared for extension to hotel, cost $15,000, for Summerset Wardle. Two storeys, 50 x 120. frame, cement foundation. hot air heating, electric light, felt roofing, interior finish B. C. pine or fir.

Sarnia, Ont.

Plans are prepared by Frank Gutteridge for new two-storey brick block containing stores, etc.; steam heating. Work will start shortly.

Saskatoon, Sask.

Architect, David Webster, has prepared plans for a new office building on Third ave. to cost $75,000. Work to start in the spring.

Sherbrooke, Que.

By-law will be submitted to the ratepayers on March 11th to grant the Cosmopolitan Clothing Co., Manager, J. B. Keating, Portland. Me., site. etc., for the erection of a factory; new machinery will be installed.

Strathcona, Alta.

Work will commence at once on the erection of a garage, cost $25,000, First ave. south, for Edinger Company (O. J. Edinger).

Toronto, Ont.

The Ontario Elevator Co. has organized and have secured site, 80 x 840 on wharf, foot of West Market street, Toronto. Plans have been prepared for grain elevator with capacity of 2,000,000 bushels. Cost $1,000,000. Toronto and Buffalo capitalists are interested.

Plans are completed for addition to store, cost $3,000, 149 Dundas street, for Wm. Van Benscotchem, 86 Wolsley street, Toronto. Architect, J. H. Locke, 548 Roxton road, Toronto. Brick, tar and gravel roofing, art stone, plate and art glass.

Differential Axles Co. are planning to erect a factory to cost $2,000,000. Plant to manufacture general traffic and conveyance equipment for steam and electric railways to be built.

The Canadian Ammonia Company have secured a Dominion Charter to do business in ammonia and will open up an office and warehouse in Toronto to cost $100,000.

Tenders are open for new store and billiard room, cost $6,000, McGee and Queen streets. for Mallory & Thatcher, Queen street west. Toronto. Masonry, carpentry, roofing, painting and glazing, plumbing, hot air heating, galvanized iron. Owner is architect.

Tenders are called until March 9th for erection of a bank building at Sunnyside, for Union Bank of Canada. Architects, Darling & Pearson, 2 Leader Lane.

Vancouver, B.C.

M. P. Thompson has purchased a site from H. Bell-Irving, 322 Richards st., Vancouver, for the erection of an arcade building to cost $60,000.

Victoria, B.C.

The Swift Canadian Co.. Victoria intend locating branch on Store street. Victoria. Council is considering the matter of railroad spur to proposed plant. Address communications to Swift & Company. Chicago, Ill.

Plans are being prepared for hotel, cor. Elliot and Douglas streets, for Criterion Hotel Company, Victoria. Architect, J. D. S. Taylor, Victoria. New wing for apartments, brick construction.

Tenders will be called at once for addition to hotel, cor. Elliott and Douglas streets. Architect, Criterion Hotel Co., (Miss Jean Mollison). Architect, J. S. D. Taylor, Bower Bldg., Vancouver.

Welland, Ont.

Tenders are called for canning factory, cost $15.000, for Goodwillie & Son, Architect, A. E. Nicholson, St. Catharines. Reinforced concrete and brick construction. General canning machinery required.

CONTRACTS AWARDED

Calgary, Alta.

Plans are prepared for lumber sheds and offices to cost $5,000, Ceepear st., for Crown Lumber Company, Calgary. Contractor, C. A. Thompson, Calgary. One-storey, frame, 130 x 130, electric lighting, shingle roof, railway spur.

A permit has been applied for to erect addition to store to cost $20,000. 7th avenue, for Calgary Furniture Co. Contractor, Jones & Lyttle, Calgary. Two additional storeys, brick, steam heating, tar and gravel roofing, 50 x 130, fire escapes, elevator.

Stores and apartments to cost $27,000. East Calgary, for Mr. Fraser. Architect. Leo Dowler. Contractor, L. R. Burns. Two-storey and concrete construction.

Edmonton, Alta.

Hotel, Jasper avenue, for Nathan Bell, proprietor Pendennis Hotel, Edmonton. Architect, Lang & Major, 656 First street, Edmonton. General contractor,

(Continued on page 73)

Tenders and For Sale Department

To Architects and Engineers

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

TENDERS

Tenders endorsed "Tender for Garbage Incinerator," and addressed to His Worship the Mayor, will be received at this office until noon on **Wednesday, March 27, 1912**, for the construction of a Garbage Incinerator and accessories complete, in accordance with specifications on file at the City Engineer's Office, where forms of tender and all information may be obtained.

The right is reserved to reject any or all tenders or to accept any that may be considered in the interest of the City.

By Order,
J. J. HOPEWELL,
Clerk of Works.
City Works Office, Halifax, N.S.,
February 28, 1912. 10-11

Corporation of the CITY OF WESTMOUNT

City Surveyor's Department

Tenders are invited for the construction of the following works:—

(A) Contract No. 13—Intercepting sewer, Western avenue.
(B) Contract No. 12—Paving of Western ave.

Drawings, general conditions, specification, schedule and form of tender can be seen at the City Surveyor's office on and after February 19, 1912.

Copies of drawings, general conditions, specifications, schedule and form of tender can be obtained on payment of fifteen dollars for each contract, which will be refunded on receipt of a bona fide tender and return of the aforesaid documents.

Sealed tenders marked with the respective contract numbers are to be deposited with the City Clerk, City Hall, Westmount, not later than twelve noon, March 11th, 1912.

Tenders will be opened by the Mayor sitting in public at 5 p.m., March 11th, 1912.

The Council does not bind itself to accept the lowest or any tender.

ARCH. CURRIE, C.E.,
8-10 City Surveyor.

COUNTY OF HASTINGS

Tenders for Concrete Mixer

Tenders are invited by the Corporation of the County of Hastings, for furnishing one concrete mixer. Same to be of the batch type, mounted on trucks, operated by gasoline engine, self-charging, automatic water supply and capable of handling not less than 8½ to 9 cu. ft. of unmixed material per batch. Specifications may be seen at the office of the Contract Record, Toronto, Ont., or at the office of the County Engineer, Belleville, Ont.

Tenders will be received up to noon of March 13th, 1912, by registered letter, plainly marked on outside of envelope "Tender for Concrete Mixer," addressed to A. W. Chapman, Esq., County Clerk, Belleville, Ont.

The lowest or any tender not necessarily accepted.

LUCIUS E. ALLEN, C.E.,
9-10 County Engineer.

Tenders and Designs for an Aqueduct

Canadian Pacific Railway Company

Department of Natural Resources
Irrigation Branch

Sealed tenders, addressed to the undersigned and endorsed "Proposal for Brooks Aqueduct," will be received up to noon of **May 1st, 1912.**

The site of the work is about four miles southeast of Brooks, Alberta, a station on the main line of the Canadian Pacific Railway, 125 miles east of Calgary. The aqueduct is about 10,000 feet long and 54 feet maximum height, and is designed to discharge 910 cubic feet per second.

Tenders will be received based either on the design prepared by the Company's Engineer or on designs to be submitted by the bidder. The Engineer's design involves the furnishing and placing of about 23,400 cubic yards of concrete and 3,640,000 pounds of reinforcing steel, together with excavation and filling to the amount of 40,000 cubic yards.

All labor and materials required will be at the expense of the Contractor.

Bidders will be required, either personally or by representative, to visit and inspect the site and satisfy themselves as to local conditions, supply of material, etc.

Plans, specifications and full information may be obtained on application to A. S. Dawson, Chief Engineer, Calgary.

A deposit of $300 will be required before plans or specifications will be given out, which will be returned on receipt of the same in good condition.

All proposals must be accompanied by a certified cheque payable to A. S. Dawson, for five per cent. of the amount of the tender, to be forfeited as liquidated damages in case the bidder neglects or refuses to enter into a contract should the work be awarded to him.

Proposals will not be considered unless made on the form provided. Interlineations, alterations or qualification prices, except as therein provided for, may invalidate porposals.

The Company reserves the right to reject any or all tenders and to waive defects.

A. S. DAWSON,
Chief Engineer,
Department of Natural Resources,
Canadian Pacific Railway.
Calgary, Alta., March 1, 1912. 9-12

CITY OF MOOSE JAW,
SASKATCHEWAN

Tenders for Steam-Electric Machinery

Sealed tenders will be received by the City Commissioners, Moose Jaw, Saskatchewan, Canada, up to 10 a.m., **March 30th, 1912**, for the following:—

Contract "A"—One 1,500 K.W. A.C. Steam Turbo-generating set.

Contract "B"—One 500 K.W. A.C. Generator, direct connected to Diesel Oil Engine.

Full particulars and specifications can be obtained on application to J. D. Peters, Electrical Superintendent.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT, City Commissioners.
W. F. HEAL,
9-11

TOWN OF OSHAWA

Tenders For Street Paving

Sealed tenders will be received up to five o'clock p.m. of **Monday, the eleventh day of March, 1912**, for the construction of a Brick or Asphalt Block Pavement, on a Concrete Base, together with a Cement Concrete Curb and Gutter, approximately 25,000 square yards.

The Pavement will include that portion of the road occupied by the track of the Oshawa Street Railway.

Plans may be seen and specifications obtained at the Town Engineer's Office, Town Hall, Oshawa, Ont.

A certified cheque for five per cent. of the contract price much accompany each tender.

The lowest or any- tender not necessarily accepted.

FRANK CHAPPELL,
Town Engineer.
Oshawa, Ont., Feb. 23, 1912. 9-10

City of Prince Albert

Sealed tenders, addressed to the City Commissioner and marked "Tenders for Cast Iron Pipe," will be received until noon on **Friday, the 8th day of March** next for the supplying of Cast Iron Water Pipe required by the City during the year 1912.

Pipe to conform to requirements of Canadian Society of Civil Engineers specifications Class "B."

Tenders to state price per ton for each size delivered in carload lots F.O.B. cars in Prince Albert, freight and duty paid. Subject to inspection and approval on delivery.

The following approximate quantities will be required:—

2,122 lineal feet 10-in. Cast Iron Pipe.
7,982 lineal feet 8-in. Cast Iron Pipe.
16,570 lineal feet 6-in. Cast Iron Pipe.

Thirty per cent. of the above quantity must be delivered on or before the 30th day of April, 1912, and the remainder on or before the 31st day of May, 1912.

(Signed) C. O. DAVIDSON,
9-10 Secretary-Treasurer.
February 17th, 1912.

CITY OF PORT ARTHUR

Notice

Sealed separate tenders, endorsed on envelope "Tender for Waterworks and Board of Works Material," will be received by the undersigned up to 6 o'clock p.m. of **Monday, March 11th, 1912**, for the supply and delivery F.O.B. City Warehouse, of the undernoted material:

Item No. 1. SEWER PIPE

2,000 ft. 20-in. No. 1 Salt Glazed Sewer Pipe.
3,000 ft. 12-in. No. 1 Salt Glazed Sewer Pipe.
2,000 ft. 10-in. No. 1 Salt Glazed Sewer Pipe.
2,000 ft. 6-in. No. 1 Salt Glazed Sewer Pipe.
1,000 ft. 4-in. No. 1 Salt Glazed Sewer Pipe.
100 pieces 6 x 4 in. Reducers (Bell End 4-in., Spigot End 6-in.).
25 pieces 6 x 6 x 6 in. Tees.
5 pieces 8 x 8 x 8 in. Tees.
5 pieces 10 x 10 x 8 in. Tees.
10 pieces 4-in. x 1/8 Tile Bends.
40 pieces 6-in. x 1/8 Tile Bends.
5 pieces 4-in. x ¼ Tile Bends.
5 pieces 6-in. x ¼ Tile Bends.
5 pieces 10 x 8 Sewer Pipe Reducers (Bell End 8-in.).

Parties tendering on Item No. 1 should quote price per foot for sewer pipe, and price each for all fittings.

Item No. 2.
50,000 Hard Brick, suitable for Manholes and Catch Basins.

Item No. 3.
150 Barrels of Cement to be delivered on or before May 10th, 1912.

Item No. 4.
1,000 lbs. Jute Packing (1-in. x 36 Strands), (bidders to quote price per ib. and submit samples).

Item No. 5.
Ten tons Pig Lead.

Item No. 6.
Five tons ½-in. No. 6 Lead Pipe.
Five tons 5/8-in. No. 8 Lead Pipe.

Item No. 7.
75 only 5-ft. lengths, 4-in. Extra Heavy Soil Pipe (One Bell).

Item No. 8.
4 doz. Tee Handles, Round Mouth Jones Shovels.
1 doz. Tee Handles, Square Mouth Jones Shovels.
4 doz. Pick Handles.
2 doz. No. 8 Rock Picks.
2 doz. 18-in. Stable Brooms.
2 kegs 6-in. Wire Nails.
4 kegs 4-in. Wire Nails.

Item No. 9.
200 bars ½-in. sq. iron cut, 5 ft. 6 in. long.
50 bars 5/8-in. sq. iron cut, 5 ft. 6 in. long.
500 lbs. 3/4-in. x 3/8-in. Iron.

Item No. 10.
100 pieces 2-in. x 6-in. x 12-ft. White Pine, dressed on one side and edge.
50 pieces 2-in. x 8-in. x 12-ft. White Pine, dressed on one side and edge.
50 pieces 2-in. x 12-in. x 12-ft. White Pine, dressed on one side and edge.
25 pieces 2-in. x 4-in. x 14-ft. White Pine, dressed on one side and edge.
10 pieces 3-in. x 10-in. x 16-ft. rough.
10 pieces 3-in. x 12-in. x 16-ft. rough.
10 pieces 3-in. x 10-in. x 14-ft. rough.
10 pieces 3-in. x 12-in. x 14-ft. rough.
10 pieces 3-in. x 12-in. x 12-ft. rough.

Item No. 11.
125 ½-in. Mueller Pat. Main Cocks, D5051.
50 ⅝-in. Mueller Pat. Main Cocks, D5051.
10 1-in. Mueller Pat. Curb Cocks, D5353.
175 ½-in. Mueller Pat. Curb Cocks, D5353.
20 ½-in. Lead Flange Union Couplings, Mueller Pat. D5001.
10 ½-in. Lead to Iron Couplings, Mueller Pat. D5002.

Item No. 12.
50 only, Manhole Castings, complete with lids.
20 only, Valve Chamber Castings, complete with lids and plugs.
30 only, Catch Basin Castings, complete with lids.

These are to be supplied as per City of Port Arthur Pattern of 1912, with properly fitted lids. The Manhole and Valve Chamber Castings should weigh about 430 to 450 lbs. each. Bidders should quote price for each complete casting; or price per lb. with approximate weight.

Parties tendering will quote prices per Unit.

All material to be delivered F.O.B. to the City Store-House, Front Street.

A marked cheque for 10 per cent. of the estimated amount of contract must accompany each tender.

Further instructions as to specifications and form of tender may be obtained from Mr. J. J. Hackney, Utilities Commissioner, at his office in the Municipal Building.

Delivery on or before May 11th, 1912.

The lowest or any tender not necessarily accepted.

J. McTEIGUE, City Clerk.
Corporation Office, Port Arthur,
February 19th, 1912. 9-10

COUNTY OF HASTINGS

Tenders for Bridges

Tenders are invited by the Corporation of the County of Hastings for the furnishing and erection of the superstructures of one 110-foot, high truss span, one 100-foot high truss span, one 65-foot low truss span, and one 60-foot low truss span, with reinforced concrete floors, all in accordance with plans and specifications of Lucius E. Allen, County Engineer.

Tenders will be received up to noon of **March 13, 1912**, and shall be mailed by registered letter, same to be marked on outside of envelope "Tenders for Bridges," and addressed to A. W. Chapman, Esq., County Clerk, Belleville, Ont.

The lowest or any tender not necessarily accepted.

Plans and specifications may be seen at the office of the County Engineer, Belleville, Ont.

LUCIUS E. ALLEN,
County Engineer.
Belleville, Ont., Feb. 21, 1912. 10

Tenders Wanted

Pumping Engine

Sealed tenders addressed to T. W. Brooke, Esq., Chairman, Water Commissioners, Windsor, Ont., and marked "Tender for Pumping Engine," will be received by the undersigned up to 12 o'clock noon, on **Monday, the 18th day of March, 1912.**

Proposal No. 1.

For the building and installing of one Horizontal Cross Compound, High Duty Crank, and Fly-Wheel Condensing Pumping Engine, having a capacity of five million Imperial gallons in 24 hours against a domestic pressure of 50 lbs. per square inch, or a fire pressure of 110 lbs. per sq. inch, with 100 lbs. steam at throttle.

Proposal No. 2.

For the building and erection of a Pump, having a capacity of eight million Imperial gallons in 24 hours, under similar conditions and specifications as contained in Proposal No. 1.

Each tenderer will furnish his own plans and specifications.

Time required to complete the work, including installing, must be stated in the tender. A certified cheque payable to the order of the Water Commissioners equal to 10 per cent. of the amount of tender must accompany each tender, which cheque in the case of an unsuccessful tenderer will be forthwith returned, but in the case of the successful tenderer will be retained until a satisfactory bond for the due performance of the work is executed, or if such successful tenderer for any reason neglects or refuses to execute a satisfactory bond within 15 days after his tender is accepted by the Water Commissioners, said cheque will be cashed and the expense of re-advertising the work required and any additional cost of building and installing said Pumping Engine over the amount of his tender will be retained from the proceeds of such cheque.

The right is reserved to reject any or all tenders.

THE WATER COMMISSIONERS,
W. A. Hanrahan, Secretary.
Windsor, Ont., Feb. 15, 1912. 8-10

CITY OF PRINCE ALBERT

Tenders for Sewer Pipe

Sealed tenders addressed to the City Commissioners and marked "Tenders for Sewer Pipe," will be received until noon on Friday, the **fifteenth day of March next**, for the supplying of sewer pipe required by the City during the year 1912.

Material to be first quality in every respect, and subject to inspection and approval on delivery. A sample of the material proposed to be furnished shall be submitted with the tender.

Price to be F.O.B. Cars, Prince Albert, freight, duty, and breakage included.

The following approximate quantities will be required:—

Size	Standard Length Straight Pipe	Y. Junctions	Bends	Slants
24-in.	3,353 lin. ft.	137		
18-in.	1,770 lin. ft.	10		
15-in.	5,812 lin. ft.	160		
12-in.	3,121 lin. ft.	49		
10-in.	6,108 lin. ft.	171		
8-in.	21,327 lin. ft.	800	30	
6-in.	3,000 lin. ft.	60	50	180
4-in.	6,000 lin. ft.		150	

Twenty per cent. of the above quantity must be delivered on or before the 30th day of April, 1912, and the remainder on or before the 3rd day of May, 1912.

Further orders will be placed for carload lots and delivery is to be made thirty days from date of receipt of order.

C. O. DAVIDSON,
Secretary-Treasurer.
Dated at Prince Albert, Sask.,
February 20th, 1912. 9-10

CITY OF TORONTO

Supply of Rail, Ties and Fastenings

Separate tenders on prescribed forms will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, up to noon on **Tuesday, March 19th, 1912**, for the supply of the following:—

1. 250 tons 45-lb. "T" rail, A.S.C.E. section.
2. 100 kegs 5-in. x 9/16-in. spikes.
3. 1,400 pair angle bars for 45-lb. "T" rail.
4. 24 kegs ¾-in. x 3-in. bolts.
5. 810 tons 80-lb. "T" rail, similar to Lorain Section 335.
6. 972 tons 90-lb. girder rail, similar to Lorain Section 392.
7. 1,100 pair splice bars for Lorain Sec. 335.
8. 1,250 pair splice bars for Lorain Sec. 392.
9. 60 kegs 1-in. x 3-⅝-in. track bolts and nuts (200 lbs. per keg).
10. 5,300 pair of ⅞-in. x 5 ft. 3¾-in. steel tie rods.
11. 6,000 steel ties and necessary rail fastenings.
12. 4,000 wood ties 5-in. x 6-in. x (6 ft., 7 ft., 8 ft. long).

Specifications and form of tender may be obtained on application to the Department of Railways & Bridges, City Engineer's Office, Toronto.

Envelopes containing tenders must be plainly marked as to contents.

Prospective tenderers will please only ask for the specifications covering those items on which they propose to tender.

Quick delivery will be required on Items No. 1, 2, 3, 4 and 12.

The tenderers shall submit with their tenders, the names of two sureties (approved of by the City Treasurer, not Members of the City Council or Officers of the Corporation of the City of Toronto) or in lieu of said sureties, the bond of a guarantee company approved of as aforesaid.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman of the Board of Control.
City Hall, Toronto,
February 26th, 1912. 9-10

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. Chicago, Ill.

FOR SALE

Centrifugal Pump

For Sale—Practically new, Centrifugal Pump, 4-in. Suction, 3-in. Discharge; driven by Double Cylinder, 2 Cycle Gasoline Engine, direct connected, and complete Rubber Hose and Piping necessary. In service only a few months; guaranteed in first class condition.

Address W. G. GIBSON,
9-11 Box 112, Port Hope, Ont.

Plant For Sale

One No. 4 stone crusher, jaw; capacity, 10 tons per hour.
One 30 horse power upright boiler.
One 30 horse power Leonard Clipper engine.
One 12-ton road roller.

The entire plant has only been used one season, in all about four months, and is in first-class condition and ready to go to work as soon as fittings could be placed. Immediate delivery, as the plant has not been working since last August. For full particulars and terms apply to

R. E. GILLESPIE,
McGill College Avenue,
8-11 Montreal, Que.

Concrete Bridges

Sealed tenders addressed to William Purves, Township Clerk, Columbus, Ont., will be received up till noon on Monday, March 18th, for the construction of twelve reinforced concrete bridges in the Township of East Whitby.

The lowest or any tender not necessarily accepted.

For plans and specifications and other information apply to

H. GIFFORD, Reeve,
Cedardale, Ont.
BOWMAN & CONNOR, Engineers,
9-10 36 Toronto Street, Toronto.

NOTICE TO CONTRACTORS

Water Works Supplies

Sealed tenders addressed to the Chairman of the Waterworks Committee, City Hall, Ottawa, will be received by the Secretary of the Water Works Committee, up to 5 p.m., **Tuesday, March 12th, 1912**, for the supply and delivery of Valves required by the Corporation.

Any tender received after the above stated time will be declared informal.

Specifications, form of tender and full particulars may be obtained on application at the City Engineer's Office, City Hall, Ottawa.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
City Engineer.
Ottawa, March 1st, 1912. 10

Notice to Contractors

Tenders will be received up to noon on **Monday, March 11th**, at the office of The Dominion Rock Drill Company, Napanee, for the different trades in the erection of new work shops for the Napanee Iron Works Limited.

Plans and specifications can be seen at the office of The Dominion Rock Drill Company, Napanee, or at my office in Kingston.

E. R. DECKWITH, C.E.,
10 Architect.

CITY OF MOOSE JAW

TENDERS for Line Material

Sealed tenders marked "Tenders for Line Material," addressed to the City Commissioners, Moose Jaw, will be received up to 10 a.m., **Tuesday, March 26th, 1912**, for the supply and delivery of the following line material, for the Electrical Department,—

Section 1. Copper and Iron Wire.
" 2. Cedar Poles.
" 3. Cross Arms.
" 4. Pole Line Hardware.
" 5. Miscellaneous Line Supplies.

Specifications and all information may be obtained on application to J. D. Peters, City Electrician.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT, City Commissioners.
W. F. HEAL,
Moose Jaw, Feb. 29, 1912. 10-11

Canadian Pacific Railway Company

Department of Natural Resources
Irrigation Branch

Tenders for Steel Highway Bridges

Sealed tenders, addressed to the undersigned, will be received up to noon of **April 15th, 1912**, for the design, manufacture and erection complete on piers to be provided by the Railway Company, of the following Steel Highway Bridges:—

Two Bridges, span 125 feet.
Four Bridges, span 100 feet.
Fourteen Bridges, span 75 feet.
Nine Bridges, span 60 feet.

Contract, specification, form of tender and general instructions may be had on application to the undersigned. A deposit of $25.00 will be required before specifications will be given out, which will be returned on receipt of a bona fide tender.

Tenders will only be received from parties who can show a reasonable acquaintance with work of the required character, and that they have the facilities and plant necessary for work of such magnitude.

A certified cheque or cash deposit to the amount of five per cent. of the tender must accompany all bids as a guarantee that the bidder will enter into a contract for the work should it be awarded to him, and which will be forfeited as liquidated damages should the bidder default.

Cheques or deposits of the unsuccessful bidders will be returned within ten days after the award of the contract.

The right is reserved to the Company to reject any or all tenders and to waive defects.

A. S. DAWSON,
Chief Engineer.
Calgary, Alta., March 1, 1912. 11-14

CITY OF SASKATOON

Tenders for

Labor on Sanitary Sewer and Water Construction

Sealed tenders addressed to the City Commissioners and endorsed "Tender for Labor on Sewer & Water Construction," will be received up to 12 o'clock noon, **Friday, March 29th, 1912**, for the laying of approximately 13 miles of Sanitary Sewer and Water Mains, and construction of all necessary Manholes and Flushtanks, setting of Fire Hydrants and Gate Valves, etc., as shown on Plans and Profiles, and according to the Specifications. The Corporation reserves the right to reject any or all tenders. All information may be obtained on application to George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL,
E. M. SNELL, City Commissioners.
Saskatoon, Sask., Feb. 24, 1912. 10-11

CITY OF REGINA

Province of Saskatchewan

Sealed tenders addressed to the City Commissioners, Regina, will be received till noon on **Wednesday, March 13th, 1912**, for the whole or part of the construction of:

2,722 lin. ft. 60-in. Reinforced Concrete Sewer Pipe.
1,697 lin. ft. 54-in. Reinforced Concrete Sewer Pipe.

Earth Work

The excavation of a trench for and the laying therein of a 60-in. and 54-in. reinforced concrete Storm Water Sewer Pipe, and 24-in. Vitrified Domestic Sewer Pipe along Seventh Avenue from Albert Street to Toronto Street, a distance of about 4,419 lineal feet.

The City reserves the right to reject any or all bids, or to waive any irregularities therein.

Copies of Plans, Specifications, Schedule, form of Tender and full information may be obtained from the undersigned.

J. M. McKAY, Chief Engineer,
Trunk Sewer Works.
Regina, Feb. 20th, 1912. 10

THE GOVERNMENT OF
THE PROVINCE OF BRITISH COLUMBIA

To Canadian Architects

Competition for New University Buildings to be erected at Point Grey, near Vancouver, British Columbia

The Government of British Columbia invite Competitive Plans for the general scheme and design for the proposed new University, together with more detailed Plans for the buildings to be erected first at an estimated cost of $1,500,000.

Prizes of $10,000 will be given for the most successful Designs submitted.

Particulars of the competition and plan of site may be obtained on request from the undersigned.

The designs to be sent in by July 31st, 1912, addressed to

THE MINISTER OF EDUCATION,
Parliament Buildings,
Victoria, British Columbia.

CITY OF SASKATOON

Tenders for

Labor on Storm Sewer

Sealed tenders, addressed to the City Commissioners, and endorsed "Tender for Labor on Storm Sewers," will be received up to twelve o'clock noon on **Friday, March 29th, 1912**, for the laying of approximately 8,990 lineal feet of Storm Sewers, and the construction of Manholes, Catch Basins and Appurtenances.

The Corporation reserves the right to reject any or all tenders. All information may be obtained on application to George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL,
E. M. SNELL, City Commissioners.
Saskatoon, Sask., Feb. 24, 1912. 10-11

Corporation of the Town of Welland, Ontario

Tenders are invited for the construction of approximately 37,000 square yards of Pavement, in Vitrified Brick, Bitulithic, Asphalt Block or Granitoid.

Plans, Specifications, etc., may be seen at the office of the Canadian Engineer, 62 Church street, Toronto, or at the Town Engineer's office, Welland, where further particulars can also be obtained if desired.

Sealed tenders fully endorsed are to be deposited with the Town Clerk, Town Hall, Welland, not later than twelve noon, March 18th, 1912.

An accepted bank cheque for $8,000 must accompany each bid. Cheques will be returned on unsuccessful tenders.

The lowest or any tender not necessarily accepted.

By order of Roads & Bridges Committee.

GEO. H. BURGAR,
Chairman R. & B. Committee.
GEORGE R. BOYD, Town Clerk.
Welland, March 26, 1912. 10-11

Notice to Contractors

THE TEMISKAMING AND NORTHERN ONTARIO RAILWAY COMMISSION

Toronto, February 24th, 1912.

Sealed tenders for the works (other than steel bridges) necessary to the complete construction of the roadbed ready for the ties and rails upon that section of the Temiskaming & Northern Ontario Railway Commission's railway extending from Earlton to Elk Lake, will be received at the office of the Secretary of the Commission, 25 Toronto Street, Toronto, until twelve o'clock (noon) on the Twentieth day of March, 1912.

On receipt of a request in writing, a copy of each of the following documents:—

Instructions to Bidders;
Form of Tender;
Specifications;
Form of Contract;

will be furnished to intending bidders at the office of the Secretary of the Commission, Toronto; or at the office of the Chief Engineer of the Commission, North Bay, where plans and profiles pertaining to the work may also be seen.

The right is reserved to reject any or all bids.

A. J. McGEE,
Secretary, Temiskaming and Northern Ontario Railway Commission

N.B.—Papers inserting this advertisement without authority will not be paid for it. 10-11

Notice

to Builders of Fire Apparatus

Tenders will be received by the undersigned up to **April 1st, 1912**, for the construction of a Modern City Service Hook and Ladder Truck, Horse Drawn, for the City of Niagara Falls, Canada.

Specifications and all particulars may be obtained by addressing

W. J. SEYMOUR, City Clerk.
Niagara Falls, Ontario.
February 29th, March 1, 2. 10-11

CITY OF TORONTO

Main Drainage Works

Sealed tenders addressed to the Chairman of the Board of Control, City Hall, will be received by registered post only, up to noon of **Tuesday, March 26th, 1912**, for the supply of Electrical Equipment for Pumping Station, Sewage Disposal Works.

The equipment includes:

One 200 horse-power vertical motor;
Two 75 horse-power vertical motors.
One 9-panel switchboard.

Plans, specifications, forms of tender and other information may be obtained at the office of the City Engineer, Toronto, Ont.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman Board of Control.
10-12

CITY OF WINNIPEG

TENDERS for Supply of Pumping Machinery

Sealed tenders addressed to the Chairman, Board of Control, will be received at the office of the undersigned up to 11 a.m. on **Monday, April 1st, 1912**, for the supply and installation of two or more Deep Well Turbine Pumps, driven by an electric motor and capable of pumping one million Imperial gallons per 24 hours. Specifications and form of tender, together with conditions governing tenders, as prescribed by By-law, may be obtained at the office of the City Engineer, 223 James Avenue, Winnipeg.

The lowest or any tender not necessarily accepted.

M. PETERSON, Secretary.
Board of Control Office,
Winnipeg, March 1st, 1912. 10

Situations Vacant

Advertisements under this heading two cents a word per insertion. Box No. ten cents extra. Minimum charge 25 cents

Engineer Wanted

The Town of Brockville requires the services of an engineer for general municipal work. Applications, giving age, experience, references and salary expected, may be addressed to John A. Mackenzie, Chairman Board of Works, Brockville, Ont. 9-10

Business Buildings and Industrial Plants

(Continued from page 69)

G. J. Thorpe, Edmonton. Three-storey, 90 x 140, brick, concrete foundation.

Halifax, N.S.

The contract is awarded for newspaper building on Cobourg road, for Herald Publishing Co., to Contractor S. M. Brookfield, Ltd., Halifax.

Montreal, Que.

Stores and apartments to cost $16,000, Fairmount and Esplanade avenues, for S. Armovitz, 1888 Esplanade ave., Montreal. Architect, A. St. Louis, 80 St. Gabriel street. Excavation, Corbeil & Frere, 192 Clarke street. Masonry, S. Rochon, 781 St. Denis street. Plumbing and heating, J. St. Amand, 1975 St. Lawrence Blvd. Three-storey, 60 x 90, brick veneer, masonry foundation, electric lighting, hot water heating, gravel roofing.

Office building, McGill street, for Sir Thomas Shaughnessy. Architects, Hutchinson, Wood & Miller, Royal Insurance Building, Montreal. Contractor, P. Lyall Construction Co., Ltd., Montreal. Ten-storey, 152 x 85, steel and reinforced concrete, concrete foundation, steam heating, electric and gas lighting, gravel roof, hardwood interior finish.

Addition to store to cost $3,000, 950 St. Denis street, for G. Singer, 35 Laval avenue, Montreal. Architect, D. Viau, 76 St. Gabriel street, Montreal. Contractor, H. Vezina, 140 Boyer street, Montreal. One-storey, 39 x 20, brick addition, concrete foundation, electric lighting, gravel roofing.

Orangeville, B.C.

Work has started on hotel to cost $50-000, for C. V. Lemerad, Princeton. 2-storey, 70 x 70, frame, hot air heating, felt roofing, interior finish, B.C. fir, lighting by lamps.

Ottawa, Ont.

Addition to hotel to cost $13,000, for Estate of Margaret Cowan. Executor, R. F Holcomb, Ottawa, Architects, J. C. Burnett, Sparks Chamber, Ottawa. Contractor, Jas. Ferguson & Sarnbut, Ottawa. Solid brick addition.

Additions, etc., to warehouse to cost $3,800, for Wm. Gray & Son, and Campbell's Ltd., Ottawa. Contractor, R. A. Benglam, 22 Baird street, Ottawa. Brick veneer and iron clad.

Warehouse to cost $21,500, Rideau street, for J. Roberts Allan, Ottawa. Architect, J. A. Ewart, Sparks Chambers, Ottawa. Contractors, Alex. Garvock & Co., Ottawa. Three-storey, solid brick addition.

Toronto, Ont.

Warehouse, Ontario and Duchess sts. for Hamilton Brewing Association. Architect, H. E. Hand, 75 Yonge street, Toronto. Plumbing, heating and ventilating, T. B. Smyth, 216 Macpherson avenue, Toronto. General contracts, W. T. Joy, 310 Russil Hill Drive, Toronto. 3-storey and basement.

Vancouver, B.C.

Business block, Homer and Dunsmuir streets, for Dr. D. H. Wilson, 1060 Chilco street, Vancouver. Architects, Dalton & Eveleigh, 615 Hastings W., Vancouver. Contractors. Baynes & Horie, Davis Chambers, Vancouver. 6 storeys, 75 x 120, brick, stores and offices. Work to be rushed.

Ten-storey office block and theatre, for Sullivan & Considine, Spokane. Superintending Architect, Lee & Camp. Spokane. Architects, Donnellan & Morcom, Vancouver. Contractor, Richard Berkman, Spokane. Ten-storey, 116 x 10, pressed brick, terra cotta, steel frame, fireproof, complete theatre equipment, restaurant and grill, 150 offices, modern heating and lighting plant.

Victoria, B.C.

Steel contract is awarded for hotel to cost $112.000, N.S. Johnson street, for St. James Hotel Co., Ltd. Interested, Chas. Hayward and F. S. Barnard, Victoria Architects, Bresman & Durfee, Sayward Bldg. Contracor, Westholme Lumber Co. Steel and concrete work, Evans, Coleman & Evans, Victoria; 120 tons of steel. Excavation is done.

Three-storey business block to cost $10,000, cor. Yates and Broad streets. Architects, James & James, Victoria. Contractor, Thos. Catterall Co. Building being remodelled and arranged for stores.

Work is in progress for re-building store and office building to cost $100,000, for T. M. Hibben & Co., Victoria. Architect, Thos. Hooper, 1108 Government Bldg., Victoria. Contractors, Westholme Lumber Co. Tearing down of old Hibben-Bone block has begun.

Winnipeg, Man.

Addition to warehouse to cost $30,000, for Alaska Bedding Co., cor. Gomez and Sutherland streets, Winnipeg. Manager, Mr. Parkhill. General contractor, Carter Halls Aldinger, 1010 Union Bank Winnipeg. Brick addition, 44 x 112. electric lighting, steam heating, automatic sprinkler system, electric motors, freight elevators. A quantity of mechanical equipment already purchased.

Work will start shortly on addition to warehouse to cost $30,000, for Alaska Bedding Co., Winnipeg. Carter Halls Aldinger, Winnipeg, contractors. One-storey added to present structure, 44 x 112, brick.

Office building to cost $380,000, cor. Main and Lombard street, for Union Trust Co., Winnipeg, 315 Portage ave. Architect, J. D. Atcheson. General contractor, Geo. A. Fuller Co., Montreal and Union Bank Bldg., Winnipeg. 13-sty., steel and concrete construction, terra cotta, brick and stone.

A permit has been granted to erect a 5-storey warehouse to cost $81,500, for Finnie & Murray, Winnipeg; Carter-Halls-Aldinger. Winnipeg, contractors; G. W. Northcote, architect, Winnipeg. Warehouse construction, brick, steel & stone.

Power Plants, Electricity and Telephones

Barkerville, B.C.

The Antler Goldfields & Development Co., Limited, capital $1,000,000, secretary, Thomas Nicol, plan to instal a large hydraulic plant at junction of Antler and Russian Creeks.

Calgary, Alta.

Tenders are called for electric conduits; salt-glazed, all sizes one to six way. Received by city commissioners until March 14th. Engineer, J. T. Child. City Hall .

Plans are being prepared for electric sub-station to cost $20,000. City Engineer, J. T. Child.

London, Ont.

Council has applied to legislature for permission to issue debentures for $66,900 for extensions to city lighting plant, meters, etc. Chairman, P. Pocock, London. Clerk, S. Baker, London.

Montreal, Que.

Electrical works of F. Thompson & Co., 326 Craig street west. Montreal, burned. Loss $10,000, and repairs will be made at once.

Moose Jaw, Sask.

Tenders are called for steam electric machinery. Received until March 30th for one 1500 K.W.A.C. steam turbo generating; one 500 K.W.A.C. generator, direct connected to Diesel oil engine. City Clerk, W. F. Heal. City Commissioners, A. W. Mayberry, L. W. Rundlett, W. F. Heal.

Nelson, B.C.

The town is planning to spend $5,000 on a new electric lighting system. Superintendent, H. P. Thomas.

Ottawa, Ont.

Tenders will be received by chairman of Board of Control until March 11th, 1912, for supply of meters, transformers, incandescent lamps, arc lamps, globes, carbons. and sundry electrical supplies. Engineer, N. J. Ker.

Princeton, B.C.

The Princeton Coal & Land Co. have secured water rights on the Similkameen river. Their present plant which supplies light to their employees will have to be enlarged to supply the town.

Miscellaneous

Nelson, B.C.

The town will spend $8,730 on fire apparatus. Ald. Walley, chairman.

North Vancouver, B.C.

The Fire & Light Committee have been authorized to call tenders for combined Chemical & Hose Wagon. G. S. Hanes, city engineer.

New Companies

Braemar Realty Company, Limited. has been incorporated with a capital of $40,000 to carry on a general business as a land and building company with head office at Hamilton, Ont. The provisional directors are W. M. Currie, W. E. Goring, and E. L. Lazier, all of Hamilton.

Central Investments, Limited, have been incorporated with a capital of $40,000 to carry on a general building and land business with head office at Toronto, Ont. The provisional directors are S. C. Arrell, R. D. Hume and H. L. Kerr, of Toronto.

Nepean Realty Company, Limited, has been incorporated with a capital of $100,000, to carry on business as a general land and building company with head office at Ottawa, Ont. The provisional directors are Chas. Murphy, H. Fisher and L. P. Sherwood, barristers, all of Toronto.

The Building and Construction Company, Limited, has been incorporated with a capital of $40,000 to engage in the business of lumber milling, brick making, bridge or railway construction, etc., with head office at Toronto, Ont. The provisional directors are H. J. Cox, E. C. Ironside and N. G. Heyd. all of Toronto.

Parkdale Realty Company, Limited, has been incorporated with a capital of $40,000, with head office at Toronto, Ont., to carry on business as a general land and building company. The provisional directors are E. W. Lennox, W. H. Burkholder and Isaac Lennox, all of Toronto.

RADIAL BRICK CHIMNEYS

H. R. HEINICKE, Inc.

65 Victoria St., Montreal, Que.
Chillas-Black, Ltd., Mail Bldg., Toronto, Ont., Agts.
147 Fourth Ave., New York

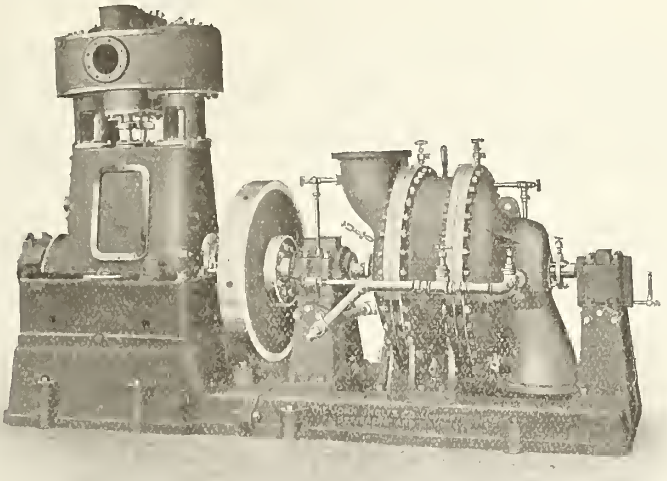
Consult Us—We are Experts—30 years' experience—Chimneys in all parts of the world

JAMES BRODIE & CO.
Quarriers and Manufacturers of
Canadian Quinsy, Ebony and Stanstead Granite
Monumental Building, Curbing, Paving, etc. Rough Stock a Specialty
IBERVILLE, QUE.

Western Lumberman
Representing the Lumbering and Woodworking interests of
British Columbia Alberta Saskatchewan and Manitoba
Winnipeg and Vancouver

Motor and Steam Driven Pumps

FOR TOWNS AND CITIES



6,000,000 Imperial Gallons per 24 hrs. 80 ft. head 475 R. P. M. Steam driven pump for city of Edmonton, Alberta,

"Inglis" Pumps give satisfactory results, because they represent the best in Engineering skill, workmanship, and design.

We manufacture Motor and Engine driven Turbine pumps to meet any requirement.

WRITE US FOR PROMPT INFORMATION.

The John Inglis Company Limited
Engineers and Boilermakers
14 Strachan Ave., TORONTO, Canada

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CATALOG?

It's a beauty, and the largest and best catalog of

Hoisting Machinery

ever published in Canada.

And why should it not be the Best Catalog, for does it not describe the Best Hoisting Machinery made in Canada?

This book also shows a splendid assortment of Derricks and Derrick Parts, Steel Buckets, Steel Skips and Steel Cars, and many other articles used in connection with Hoisting Machinery.

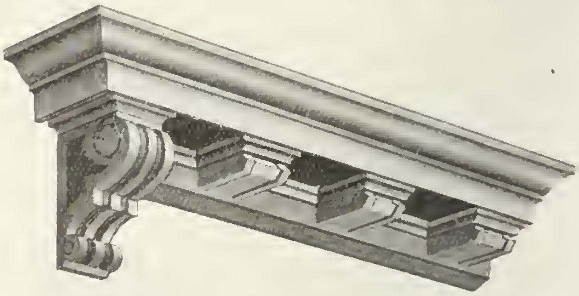
If you are interested in these goods drop us a line, so we may mail you one of these fine catalogues. You will not be sorry.

Marsh & Henthorn, Limited
Belleville, Ont.
Makers of Hoisting Machinery
Sales Agents: MUSSENS Limited, Montreal

WRITE FOR OUR

Galvanized Cornice

CATALOGUE

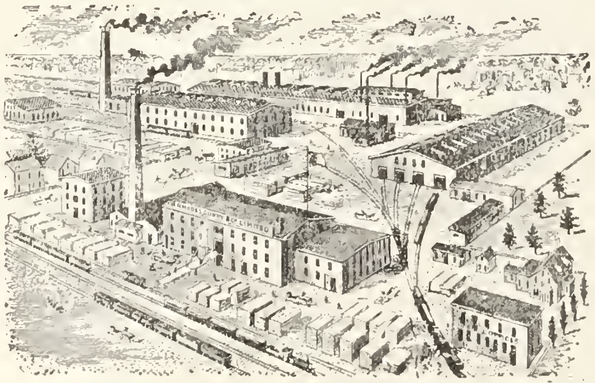


We illustrate scores of designs from which to choose or which will give you suggestions from which to design your own cornice.

Catalogue or special designs executed promptly by thoroughly competent workmen.

The Metallic Roofing Co.
LIMITED
Manufacturers
TORONTO, ONT. WINNIPEG, MAN.
(46)

Rhodes, Curry Co., Limited
Lessees



Bank and Office Fittings

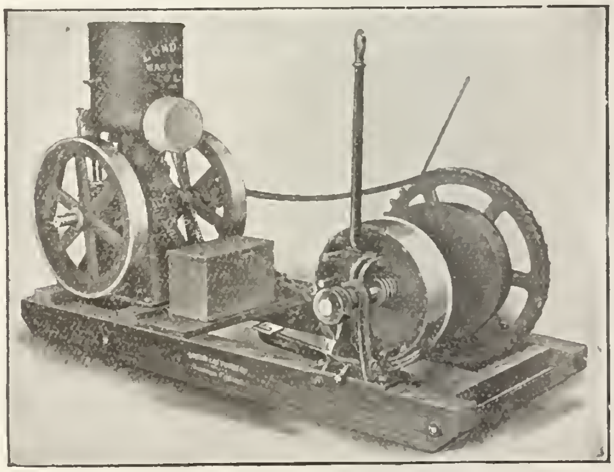
SCHOOL DESKS A SPECIALTY

We manufacture all kinds of building materials, including cast iron columns, cresting, sash weights, etc.

In addition to our large stock of native lumber, we are now carrying about one million feet of foreign lumber, including oak, walnut, ebony, whitewood, basswood, red cedar, Douglas fir, mahogany, &c.

Rhodes, Curry Co., Ltd. Amherst, N. S.
BRANCHES AT
Halifax Sydney

Do You Want a Good Hoist?



Patent Applied For

"London" Friction Clutch Hoist

Here are a few of its many uses

Contractor's Work
Bridge Building
Mortar Conveying
Sewer Building
Well Digging
Pile Driving

This hoist can be used with any make or style of gas, gasoline or oil engine

The London Gas Power Co., Limited
Engineers and Machinists **London, Canada**

MODERN BUILDINGS
REQUIRE
MODERN ELEVATORS

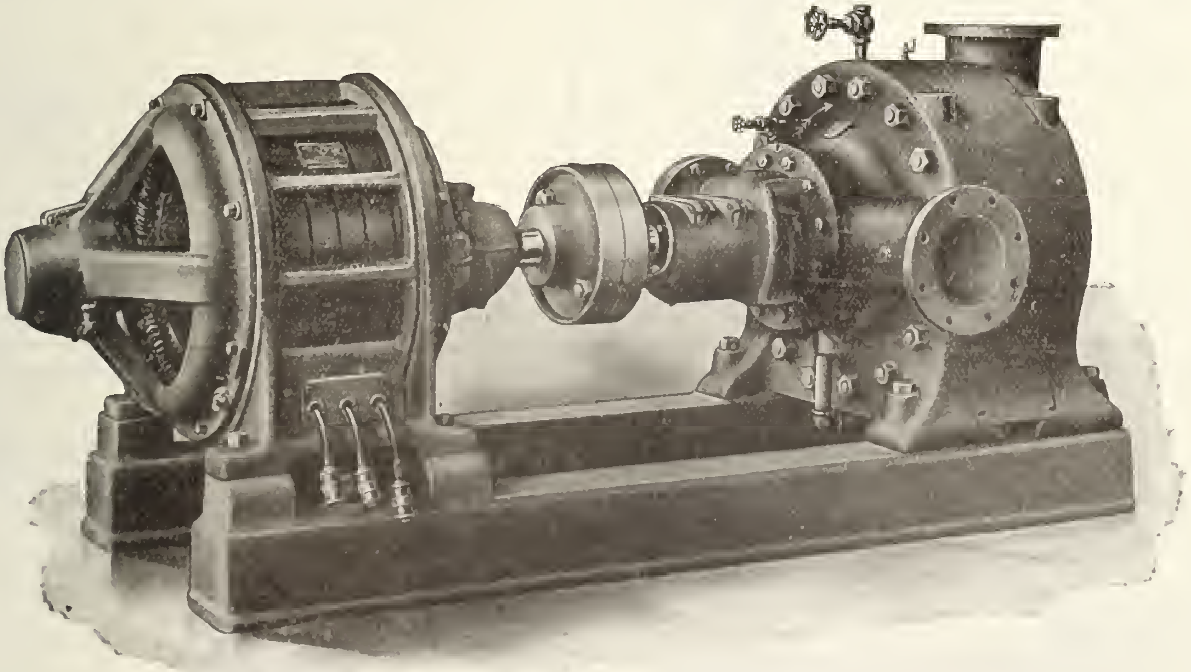
We build both plunger and electric elevators with patented improvements to secure better control and operation

---

THE JOHN McDOUGALL CALEDONIAN IRON WORKS CO.
LIMITED
WORKS: **512 WILLIAM STREET, MONTREAL**

Sales Offices: MONTREAL TORONTO COBALT WINNIPEG CALGARY VANCOUVER

Electrically Operated Turbine Pumps for All Duties



CANADA FOUNDRY COMPANY, Limited
TORONTO MONTREAL HALIFAX OTTAWA COBALT WINNIPEG CALGARY VANCOUVER NELSON

Orleans Filtration Plant and Concrete Building taking about 100,000 barrels of Alsen's New Cement

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
45 BROADWAY, NEW YORK

ANOTHER TEST

Put on a wall two sheets of lath, one the ordinary kind and one of Herringbone. Mix your plaster too wet and without sufficient hair. By varying your mix you will easily find a plaster which will drop badly from the back of the ordinary lath but will not drop from the Herringbone.

Herringbone Lath gives the best key

CLARENCE W. NOBLE
General Sales Agent
117 Home Life Building, **Toronto**
Metal Shingle and Siding Co., Manufacturers

Merriman One-Car Asphalt Plant

The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.

Many special features. Write for full particulars.

Also Asphalt Mixers

East Iron & Machine Company, Lima, O., U. S. A.

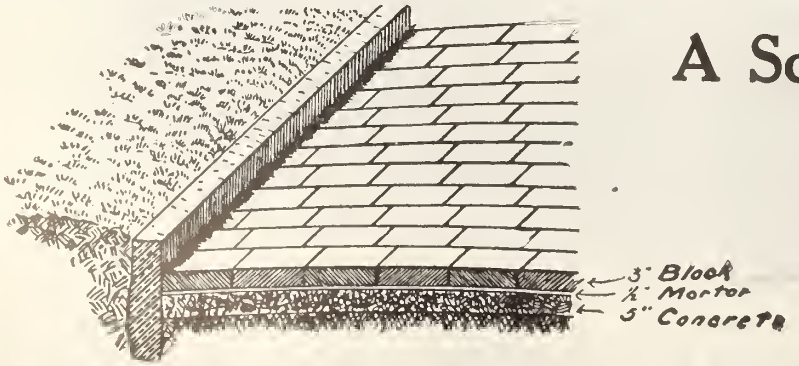
EVERYTHING YOU WANT

in a Factory Site

Water, drains, sidewalks, gas, electric power, tramways, three railways, police and fire protection and all Montreal's facilities

at

Maisonneuve, Que.



A Scientific Pavement

must be

Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by

Asphalt Block Pavements

Send for Descriptive Literature

The Ontario Asphalt Block Company, Limited - Windsor, Ont.

Lap Welded Steel Pipe

MADE IN SIZES

12 to 72 inches Diameter

Used extensively for Water Supply for Mines, Mills, Hydraulic Operations and High Pressure Hydro Electric Installations.
Ask our Welded Pipe Dept. for prices.

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MANUFACTURERS OF

SPIRAL RIVETED PIPE LAP WELDED PIPE
FORGED STEEL FLANGES

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Crushed Stone

All sizes. For Roadways and Sidewalks also specially adapted for

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Our arrangement with C.P.R. to have our stone brought to Toronto DAILY by SPECIAL TRAIN makes our DELIVERIES promptest possible.

Phone Main 5377 or Write

Christie, Henderson & Co.
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Head Office: **34 Yonge Street, TORONTO**

A Stucco or concrete house needs protection with the original

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BRICK AND CEMENT COATING

The coating prevents discoloration or cracking from moisture and does not destroy the pleasing texture of the concrete or stucco. It has been endorsed by the National Board of Fire Underwriters as a fire retarder and is a perfect protection as well as a beautiful tint for the exteriors or interiors of residences, hotels, garages, factories and mills.
ON FLOORS it stands wear and washing and does not disintegrate. Let us send you a book which tells all about it and a list of the well known homes, hotels, mills and factories on which it has been used. Address, mentioning this medium.

Wadsworth Howland & Co., Inc.
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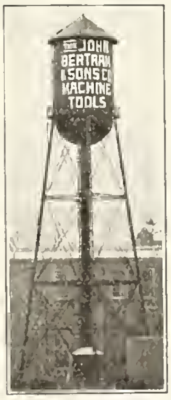
Telephone North 663

Fred Holmes & Sons
Limited

Building Contractors

1113 Yonge St., Toronto



The Des Moines Hemispherical Bottom Steel Tanks and Towers

have been used and approved by nearly all leading Engineers. They are undoubtedly the most economical means of storing water at an elevation.
We have built many of these in Canada the United States and Mexico.
Estimates cheerfully furnished.

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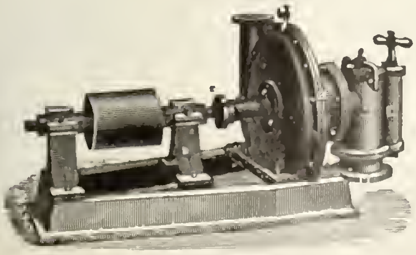
Des Moines, Iowa, U.S.A. 938 Tuttle St.

F. H. Hopkins & Company, Canadian Representatives, Montreal, Quebec

M. Beatty & Sons, Limited Welland, Ontario, Canada

Dredges, Ditchers, Derricks, Steam Shovels

Steel Dump and Deck Scows



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Mine Hoists, Hoisting Engines
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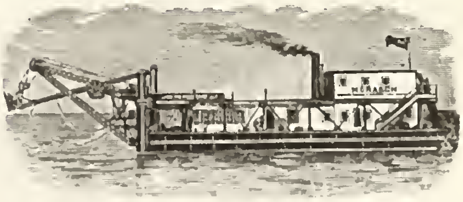
and other Contractors' Machinery.



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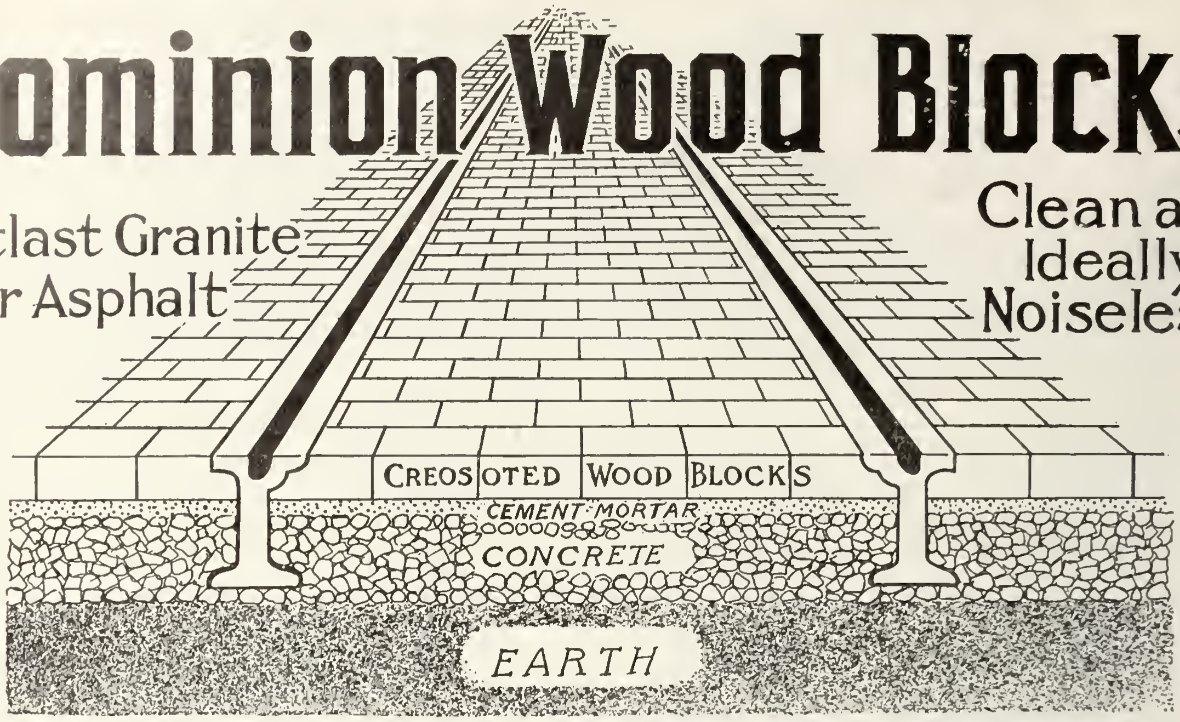
Outlast Granite or Asphalt

Clean and Ideally Noiseless



The Proof of the Pudding

May be in the eating; which seems also to suggest ease of early dissolution. The exact reverse applies to the PROOF OF A

Permanent Pavement

One that requires the constant attention of the Repair Gang to prevent its break-up and ruin could not be said to have proven satisfactory. Yet the Repair Gang seems to be an essential feature of Patent Pavements. ¶ How often have you seen the **Creosoted Wood Blocks, The Wood Eternal,** being PROVED IN THE PUDDING MANNER? ¶ Dominion Creosoted Wood Paving Blocks are cut from the log of live Douglas Fir in our own mills.

Dominion Creosoting Company

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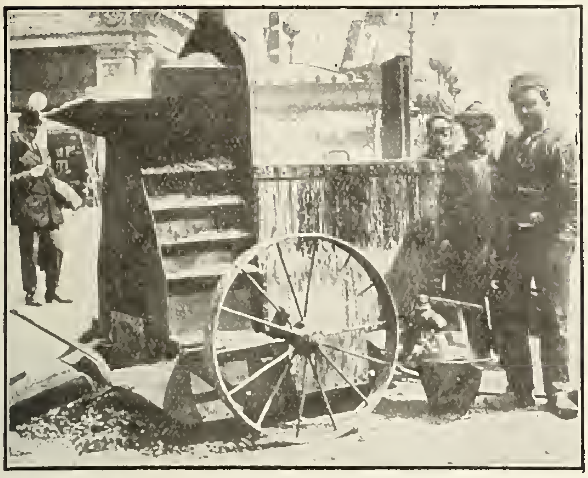
Vancouver B.C.

LIMITED.



The Mullen Combination Tar Kettle and Gravel Heater

A Money Maker for Contractors

Is on wheels and can be easily moved about. Supplies hot gravel and hot tar from the one fire.

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Tide Water Iron Works
HOBOKEN, N. J., U. S. A.

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Phones: Main 5472-5473
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Hard Wall Plaster
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Parker's Corner Bead
Plaster Paris
Plasterers' Hair
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Mortar Colors
Weeping Tile
Sewer Pipe

We can make immediate delivery of any of the above materials from any one of our branch yards. Would be pleased to have your order.

"Hammer Brand"
Hard Wall Plaster

HARD-WALL PLASTER
HAMMER
TRADE MARK
BRAND
HILLSBOROUGH, N.B.

It neither loosens nor falls off, it allows carpenters to follow plasterers without loss of time and lasts as long as the building.

Albert Manufacturing Co.
Hillsborough, New Brunswick, Canada

Works Destroyed by Fire
—Now Rebuilding

"A Canadian Roller
for Canadian Roads"

THE WATEROUS
DOUBLE CYLINDER
STEAM ROLLER

is built essentially to suit Canadian road building conditions. Over 100 Rollers in use in Canada to-day are proving their ability as road makers of the highest quality. A greater rolling capacity, with less cost of maintenance and operation, are its distinguishing characteristics. *Bulletin No. 701*

The Waterous Engine Works Co.
Limited
BRANTFORD, CANADA

Agent:—Hugh Cameron & Co., 72 Queen St. E., Toronto, Ont.

CONTRACTORS

Who tender the bond of the

AMERICAN SURETY COMPANY

of New York

THE LARGEST SURETY COMPANY IN THE WORLD

will have a **Distinct Advantage** in bidding for work.

Owners are now insisting on . . **ABSOLUTE SECURITY** for the performance of contracts . .

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Telephone Main 2609.

W. H. HALL, Manager, Toronto, Ont.

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Missisquoi Marble Company

Limited

Canada's Pioneer and Leading Concern in the Marble Business

They will sell you Quarry Blocks, Sawn Marble, Marble completely finished for either interior or exterior purposes, and, if necessary, they will contract to set it in place.

Samples may be seen at District Sales Offices:—

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C. N. Barclay - -	Winnipeg Man.
Bosse & Banks - -	Quebec, Que.
General Contractors Supply Company, Ltd. -	Halifax, N. S.
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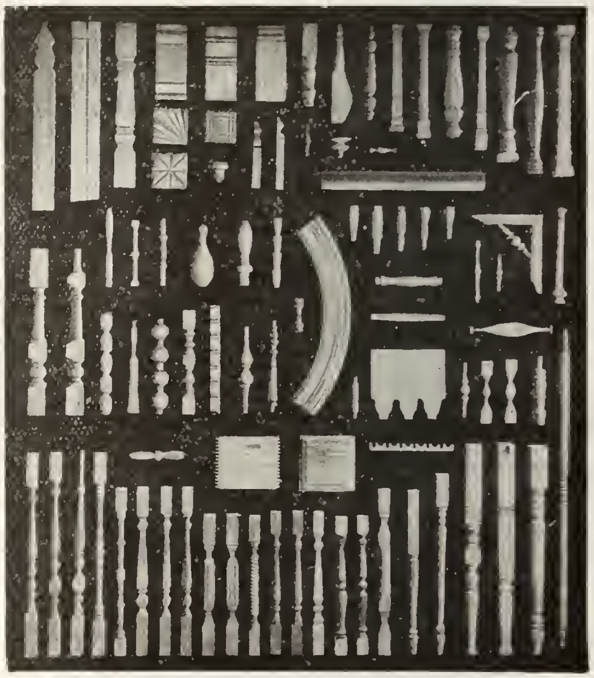

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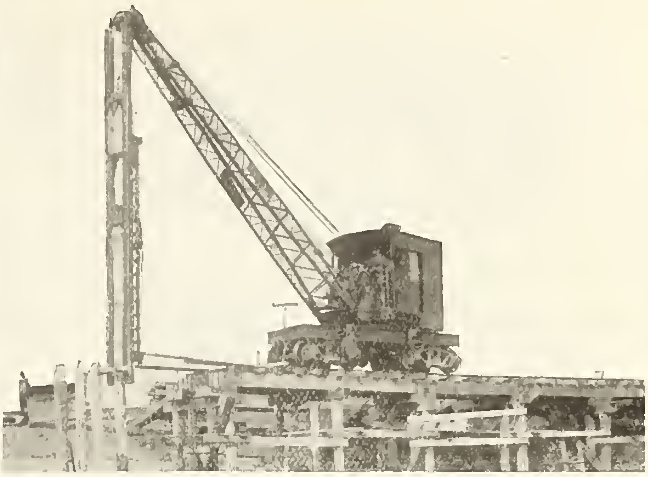

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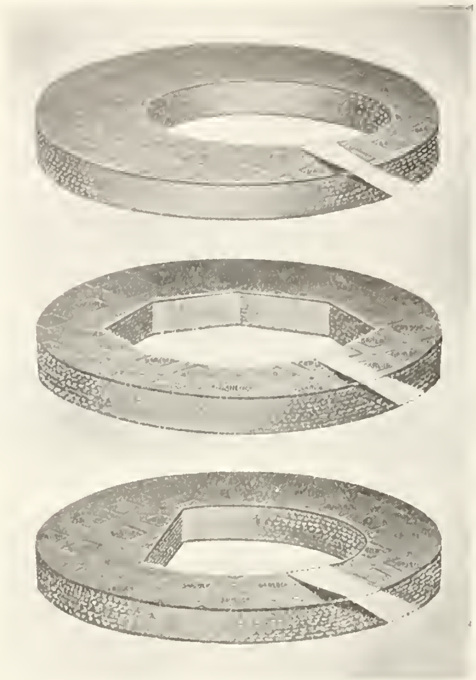

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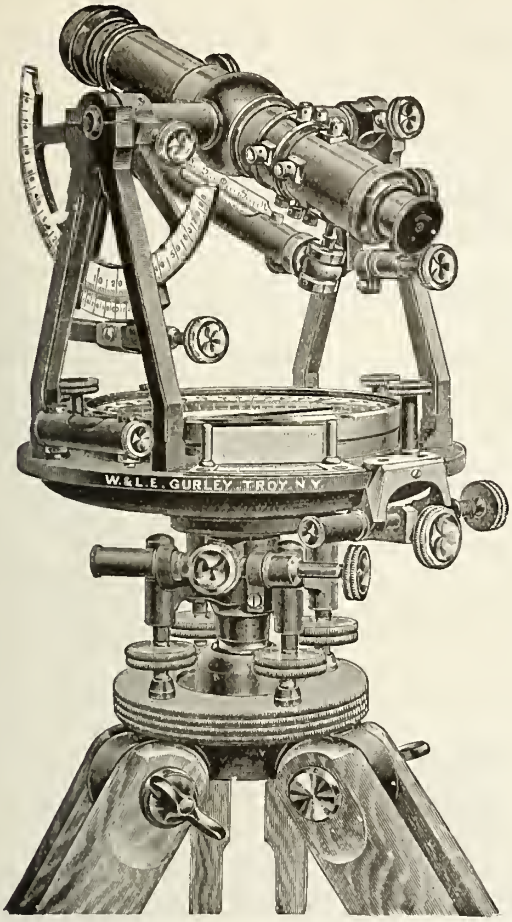
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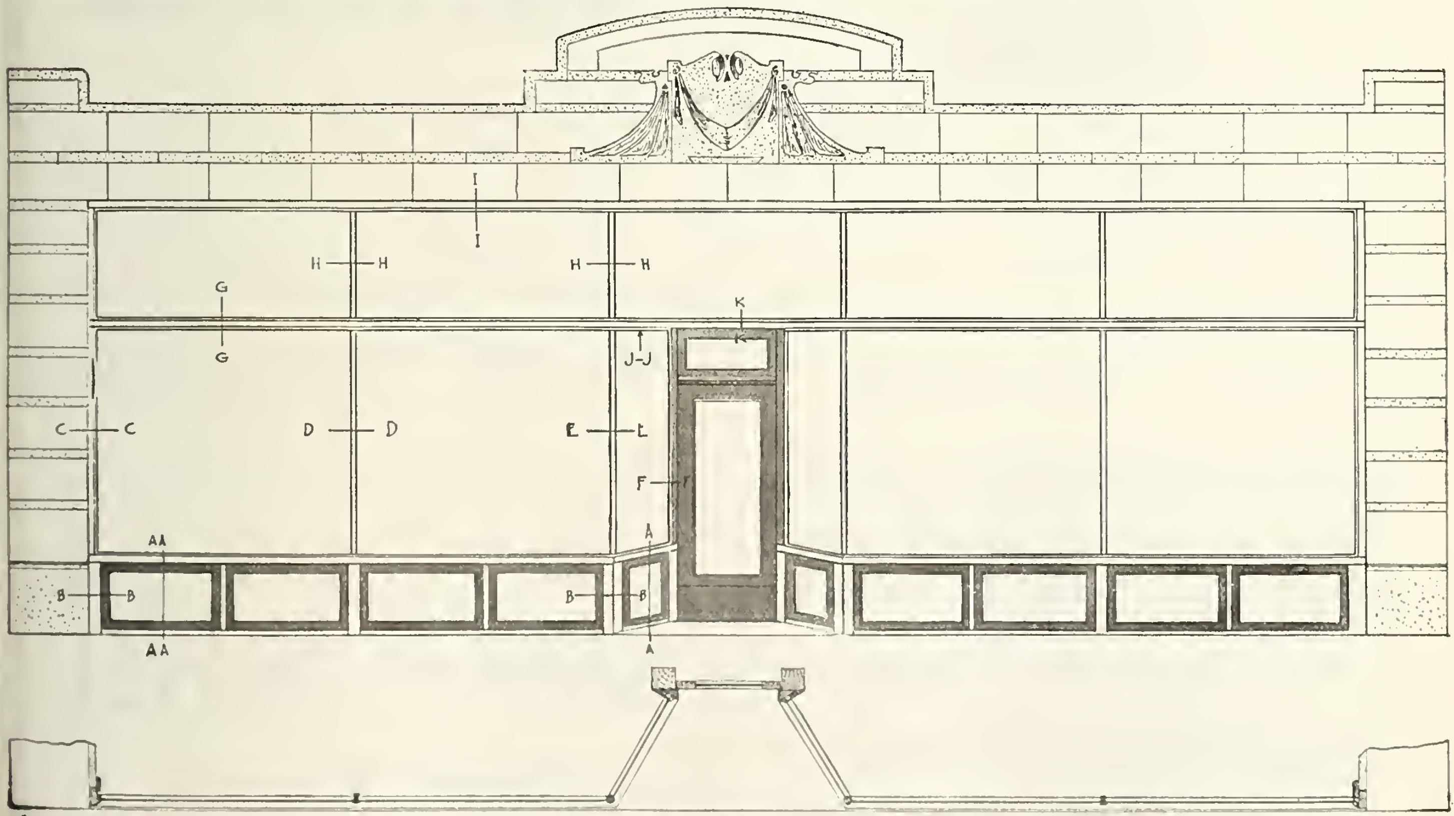

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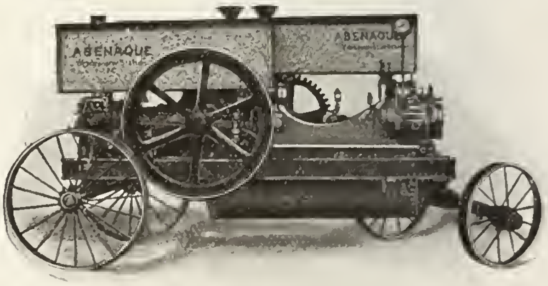

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No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

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	Star.	D.D.
10 to 25 united inches........	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 '	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.50	$ 6.75	$ 5.25
40 u. i.	4.25	3.75	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts—Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

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Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 per cent.

No. 4 compression bath cock	net $1.75
No. 4½ Fuller's	net $2.35

Square head brass cocks, 65; iron, 65 per cent.

Boilers—Galvanized Iron Range

30 gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)	Black.		Galvanized
¼ inch	1.80	¼ inch	2.57
⅜ "	1.80	⅜ "	2.57
½ "	2.35	½ "	3.23
¾ "	2.75	¾ "	3.83
1 "	3.93	1 "	5.48
1¼ "	5.35	1¼ "	7.49
1½ "	6.44	1½ "	8.98
2 "	8.05	2 "	11.46
2½ "	12.85	2½ "	18.30
3 "	16.86	3 "	24.03
3½ "	22.57	3½ "	33.65
4 "	25.65	4 "	35.90

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-nch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

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Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

Crushed stone, 2-inch, $1.30; 1-inch, $1.30; ⅜-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and leads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $3.00.

Manilla Rope, best, per pound, 16½ cents.

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Pure White Lead, ground in oil, $6.75 to $7.00 per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, 99c. per gallon of 9 lbs.

Raw Linseed Oil, in barrels, 96c. per gallon of 9 lbs.

Turpentine, in barrels, 73c. per gallon.

Pure Red Lead, dry, $5.50 to $6.50 per 100 lbs.

Business Notes

Hamilton, Ont.

Shoe store of the Marshall Shoe Co., 327 King west, damaged to extent of $5,000.

Harrow, Ont.

Readman's general store, Halstead's gents furnishings store and Arthur Best's tinsmithing shop were destroyed by fire. Loss estimated at $30,000. Damaged buildings to be re-built. In the meantime temporary quarters will be fitted up.

Longue Pointe, Que.

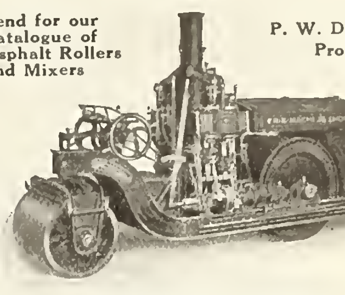
The Montreal Locomotive Works, Montreal, roof stock and machinery, has been damaged by fire, to extent of $4,000.

Montaque., P.E.I. (near Charlottetown)

Fire destroyed store and residence of Montaque Furnishing Co. Manager, D. L. McKinnon. Loss, about $10,000.

Wallaceburg, Ont.

Dominion Carlite Explosive Co. factory burned, loss $15,000. President, D. A. Gordon, Wallaceburg. Will rebuild this spring.



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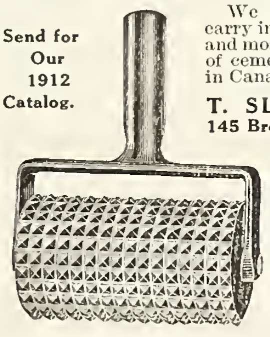

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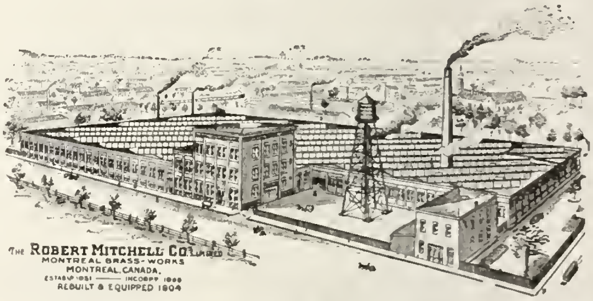
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CANADIAN EXPRESS BLDG., MONTREAL, QUE
Branch Offices,
TRADERS BANK BUILDING, TORONTO ONT.
Norfolk House, LAURENCE POUNTNEY HILL, LONDON. E.C.

The

Laurentian Granite Co.

Limited

MANUFACTURERS OF

Building Granite, Granite Setts, Curbing, Etc.

Samples Furnished and Prices Quoted on Application

Rose and Pink Granite Quarries at Staynerville, P. Que., Co. Argenteuil, on C.P.R.

Bank of Ottawa Bld'g.
224 St. James St. **Montreal**

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Bonds of Suretyship

for Officers and Employees in positions of trust.

Bonds Bid and Supply

in lieu of Certified Cheques, when necessary in Tendering or Contracting for the Furnishing of Supplies.

The Guarantee Company of North America

The Pioneer Company. *Established 1872*

Head Office - Montreal

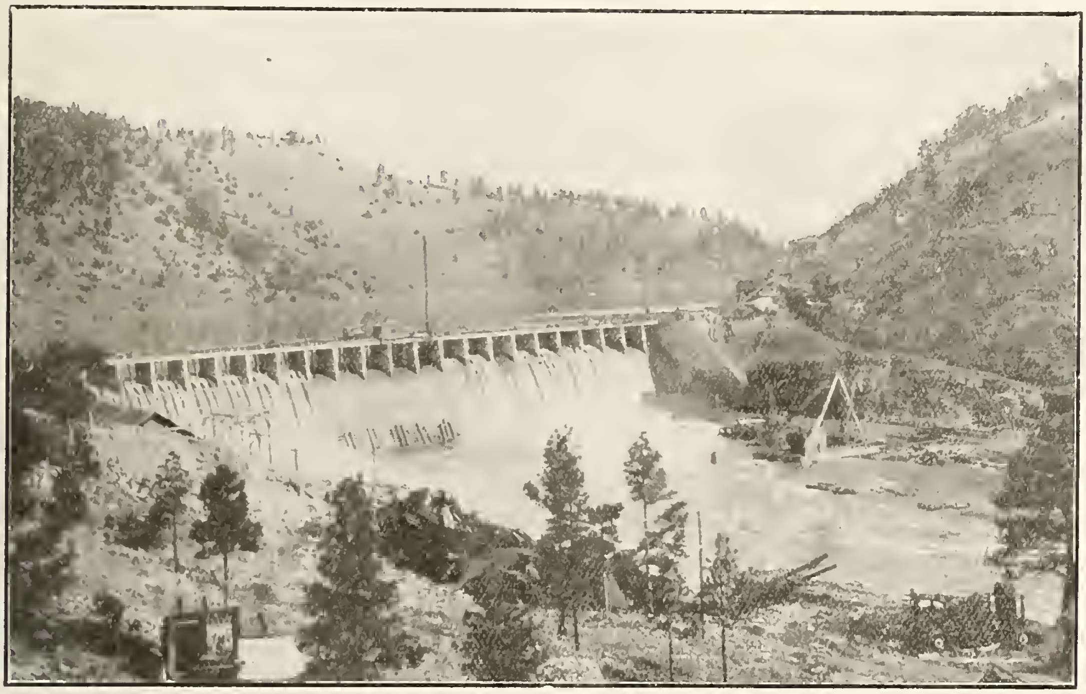
Capital and Resources over - $2,000,000
Claims Paid over - - - $2,300,000

NO CLAIMS IN DISPUTE

This Company is not a party to any premium tariff combination.

THE FOUNDATION COMPANY
LIMITED

Bank of Ottawa Building - Montreal, Canada



We make a specialty of

Water Power Construction
Power Plants, Dams

OUR SCOPE

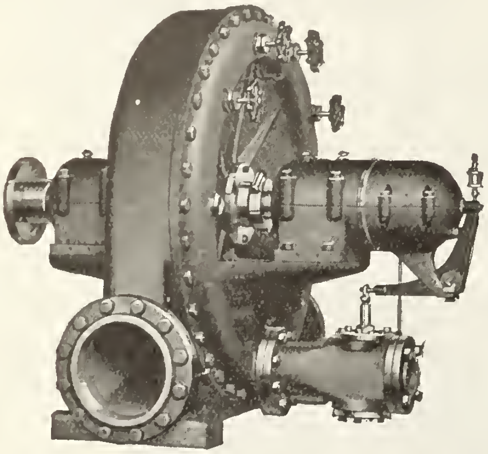
- BRIDGE PIERS
- MINING SHAFTS
- TUNNELS
- WATER POWER CONSTRUCTION
- POWER PLANTS
- SEAWALLS
- WHARVES, QUAYS
- DAMS
- LIGHTHOUSES
- HEAVY BUILDING FOUNDATIONS

With a large equipment of **PLANT** and a well-organized **FORCE** we are prepared at all times to undertake difficult work on the shortest notice.

We Invite Inquiries in Reference to Cost and Design of Difficult Foundation Work.

Sturtevant

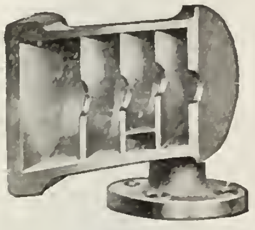
The Economical Steam Turbine



One of the Secrets of Slow Speed Economy is The Sturtevant Supplementary Bucket

Our new catalog 190z describes and illustrates the new Sturtevant features which make this turbine the most economical of its size on the market today.

Send for this New Catalog 190-Z



Nozzle, Reversing Bucket and New Patented Supplementary Bucket.

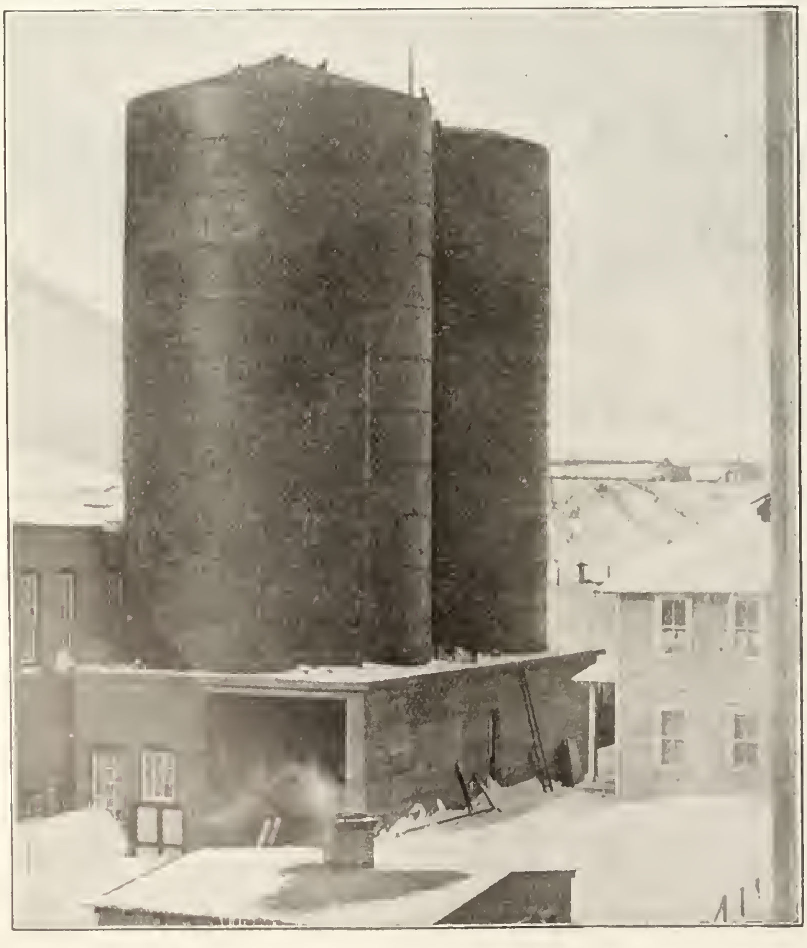
Lower Water Rates by our New Patented Devices

B. F. STURTEVANT CO., - Hyde Park, Boston, Mass.

Polson Iron Works, Limited, Toronto **Eadie-Douglas, Limited, Montreal**

Offices in all principal cities.

880



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Pulp and Paper Mills
Chemical Works
Oil Refineries, Etc.

We also build

Steel Structures

to support them.

Write us for quotations

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"PROUDFIT" BINDERS

Absolutely flat opening, gives blank book convenience with loose leaf utility. No metal parts exposed. Easy to operate. Guide bands made of especially tempered steel, will not break, cannot crack or become rough.

"Proudfit" Binders pay for themselves in time saved alone.

Business Systems Limited, 52 Spadina Ave. TORONTO
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Engines and Boilers

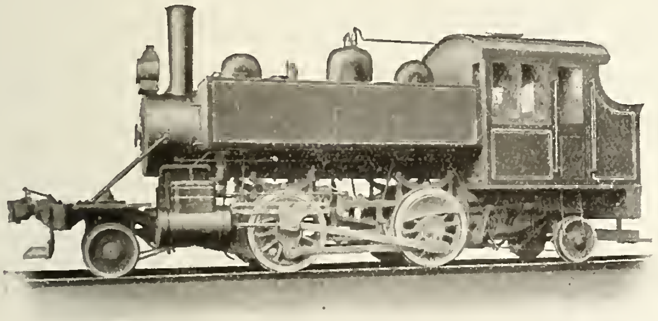
of all types and sizes, Heaters, Tanks, Pumps, etc.

E. Leonard & Sons LONDON ONT.

AGENTS:
MONTREAL ST. JOHN, N. B. WINNIPEG CALGARY VANCOUVER

Agents for {**National Gas Engine Co.**
Browett-Lindley Vertical Engines

INDUSTRIAL LOCOMOTIVES



It is important for you to know what a locomotive will do to justify its cost.

It must pull the required load, start it and keep it going.

It must provide just the right amount of the right material in the right place.

Each and every part must be sure to fit not only the locomotive of which it is a part, but every other locomotive of the same size and design. Every operation must be made in fixtures or to templets compelling accuracy of manufacture so that the machine will not be idle at a critical time for necessary repairs or renewals. Spare parts must be instantly available, made so well as to go into place without a machine shop.

Visit our works and see how all this is accomplished.

MONTREAL LOCOMOTIVE WORKS, LIMITED

BANK OF OTTAWA BUILDING, MONTREAL, CANADA

Cumberland County Quarries

Red and Grey Freestone

Oakley Myers, Amherst, N.S.

Hardens with Age. Low Price. Samples and Quotations Free

Crushed Stone, Limited

STONE of any Size and in any Quantity on hand for Sidewalks, Roadwork or Concrete Work

Works :
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Phone Main 4516

Head Office :
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G. W. ESSERY, Manager

Steel and Wood TANKS

Suitable for Sprinkler Systems
Fire Protection, Water Supply
Plants, etc.

Steel Substructures of all kinds
(Galvanized or Painted)

Windmills, Gasoline Engines,
Hydraulic Rams, Etc.

Ontario Wind Engine & Pump Co.
Limited
TORONTO WINNIPEG CALGARY

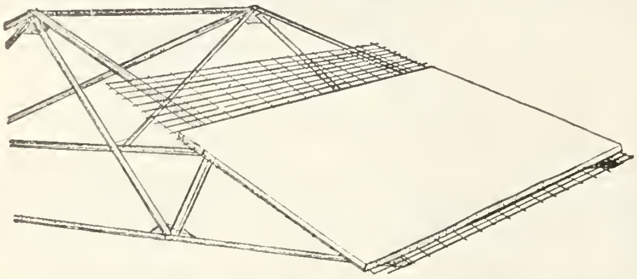
For Sale for Immediate Delivery

- 1—Buckeye Trench Machine, cuts trench 15 in. x 5½ ft.
- 1—Buckeye Trench Machine, cuts trench 28 in. x 7½ ft.
- 1—Buckeye Trench Machine, cuts trench 36 in. x 12 ft.
- 1—Parson Trench Machine, cuts trench 24 in. to 60 in. x 20 ft.
- 1—Municipal Trench Machine, cuts trench 24 in. to 72 in. x 20 ft.
- 1—26 ton Little Giant Traction Shovel.
- 1—45 ton Vulcan Track Shovel.
- 1—No. 0 Thew Full Circle Shovel.
- 1—No. 5 Austin Crusher with Corrugated Head and Back Gear.
- 1—No. 5 Gates Crusher Style "K" with smooth head in excellent condition.
- 1—No. 5 McCully with new head and new shaft.
- 1—Set of 16 in. x 36 in. McCully Rolls.

CREAM CITY EQUIPMENT COMPANY

600 Majestic Building, Milwaukee, Wis., U. S. A.

Concrete Reinforcement



Our Bonding is a Crimped STEEL WIRE Fabric

Can be made in any Length or Width to suit you.

We claim in the erection of roofs and floors our continuous reinforcement has no superior, inasmuch as it knits the entire mass into an actual monolithic slab, weak at no point and so tied together that in case of accident from any cause whatever, no single section would fall but would be sustained by carrying capacity of wires running in continuous lengths over top of roof trusses or purlins

Inquiries Solicited

When in Need of—

Ornamental

Wire and Iron Work

SEND US YOUR ENQUIRIES

We specialize in

Jail and Prison Work

Canada Wire & Iron Goods Co., Hamilton

There's a Reason Why

ELATERITE Paints and Waterproofings

Are Superior to ALL Others.

Cut shows application of plaster coat over "Elaterite." It both BONDS & WATERPROOFS. Catalogue "CR" gives details.

It's the natural characteristics of the rubbery pigment—intensely adhesive quality; resistance to all acids and heat; permanent elasticity and pliability; absolute waterproof character.

There's an "Elaterite" for every kind of surface.

Write for "History of Elaterite" to

FRANK CAMPBELL, Mgr.

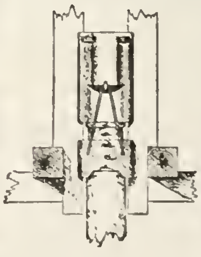
815 Bathurst Street, TORONTO

PILE DRIVERS

VULCAN IRON WORKS CHICAGO ILL., U.S.A.

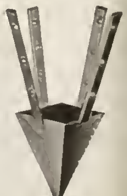
Station D

Steam Hammer



Casgrain Pile Cap

Perfect Head Block



This old man can do as much work in eight hours with one 56 lb. Class "B" McKIERNAN-TERRY Hammer Drill as ten husky high class miners can do, drilling by hand.

He can do as much work in eight hours as two high priced drill runners and two "chuckers" can do with 2-3 1/8" Standard Reciprocating Rock Drills and the CLASS "B" ONLY USES 65 cu. ft. OF AIR PER MINUTE AGAINST 135 cu. ft. per minute for each of the 3 1/8" old style drills.

This little Class "B" will "down" holes, either wet or dry, from 6 to 8 ft. deep.

THE VERY THING FOR SHAFT SINKING

Its PRICE is LOW. Its EFFICIENCY HIGH. We carry them in stock.

Canada Foundry Company, Limited

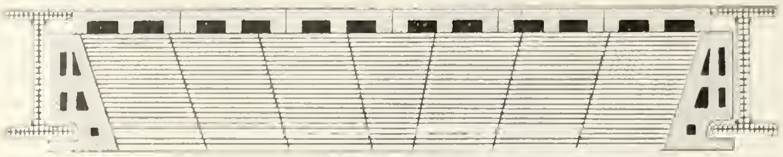
Cor. King and Simcoe Sts., TORONTO, Ont.

District Offices :

Montreal, Halifax, Ottawa, Cobalt, Winnipeg, Calgary, Nelson, Vancouver, Prince Rupert

Porous Terra-Cotta Fireproofing

Floor Arching
of Every Description
Roofing
Column and Girder Covering
Wall Furring and Partitions
Boiler Covering and Flue Linings



Type of Floor Arching—End Construction

POSTAL ADDRESS:
Scarboro' Junction
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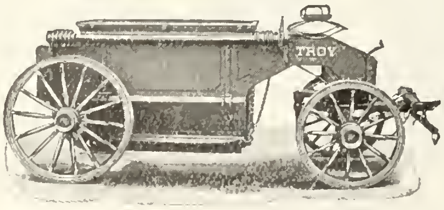
ROBERT BENNETT, CONTRACTOR, **Toronto**
Telephone, Beach 4

'Me for the Close Coupled Wagon'

Says the Teamster



The New Short Coupled TROY

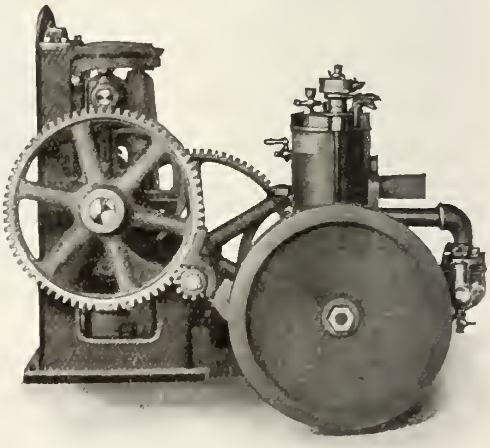
Just ask the next ten teamsters which they would rather hitch to—a long or a short coupled wagon. Ten out of ten will say, "SHORT." All the diagrams and figures in the world won't convince the man on the job that a short coupled wagon dosen't pull easier.

Have you had a price on the New TROY?

Get Catalog 22.

The Troy Wagon Works Co.
North Market St., TROY, OHIO.

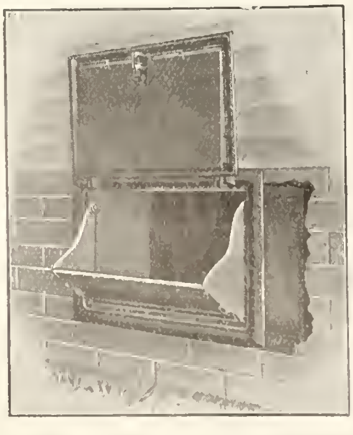
The Luitwieler System



Our deep well working head will save one-half the power consumed by other deep well pumps.

Any Power - Any Capacity

The General Machinery Co., Ltd.
526-7 Traders Bank Building
TORONTO, ONT.



EQUIP YOUR CELLAR

with one of our "Majestic" Coal Chutes which is the neatest and best equipment for any cellar. It is easily installed in either new or old houses. It permits coal, wood or vegetables to be put into the cellar without disfiguring the building in any way. And unlike a glass window it cannot be broken. The hopper can easily be removed if desired to put in very coarse coal or wood, or if a waggon chute is used. It swings back into the chute and allows the door to be closed. The door is made to lock when opened upward, and protects the wall or siding above the chute, and can be released only when closed. We make three standard sizes. There's a size that's just right for your cellar and your requirements. No. 1—22 x 16 x 13 No. 2—27 x 16 x 13 No. 3—33 x 22 x 18

Send for our illustrated booklet, it shows and describes our full line of Coal Chutes

The Down Draft Furnace Co., Limited
Galt, Ontario, Can.
Montreal Representative: E. F. Dartnell, No. 8 Beaver Hall Square.
Gorman, Clancey & Grindley, Agents, Calgary and Edmonton, Alberta.

J. J. Turner & Sons

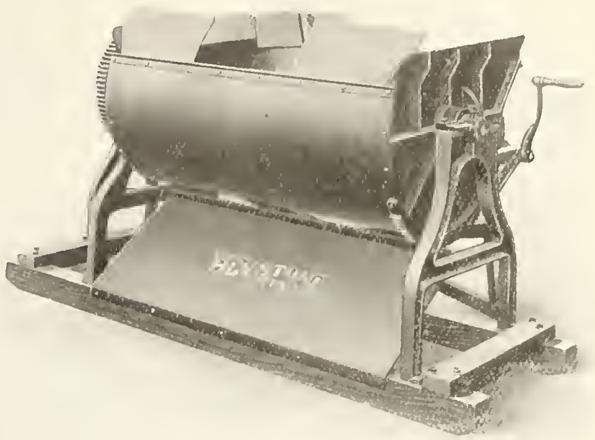
Peterborough, Ont., and Regina Sask.

THE LARGEST MANUFACTURERS AND DEALERS IN CANADA OF

Contractors', Surveyors' and Lumbermen's Supplies

Tents, Covers, Straw Ticks, Sleeping Bags, Grey Blankets, Oil Clothing, Nose Bags, Coal Bags, Snow Shoes, Toboggans, Moccasins, Flags, Awnings, Sails, Canoes, Row Boats, Paddles, Oars and every description of Camp Supplies. Sole manufacturers of the Walsh Window Tent for Consumptives. Send us your orders.

Prompt Shipments Guaranteed.



Blystone Skid Mixer

One of the great features of this Batch Mixer is the simple but effective dumping device, worked by the crank handle on the right. Three turns forward dumps the material and three turns back replaces the mixer in position for the next batch. So accurately balanced a ten year old boy can dump it. A thoroughly efficient machine, it will thoroughly mix the concrete in minimum time and discharge the material quickly. The above cut shows the mixer ready for filling.

Catalogues sent on application.

The Blystone Machinery Company
52 RAILROAD STREET
Cambridge Springs, Pa., U. S. A.

TRADE MARK
"Bestoslate"
ASBESTOS
SHINGLES

Here Is A Roofing That Will Never Decay

You cannot make cedar, cypress or redwood shingles water proof—weather proof—decay proof—they are short lived under the best of treatment and repair expense comes often.

Specify and use "Bestoslate" shingles—a roofing that is not only decay proof but fire proof—make your clients' first cost the last cost.

Ask for our catalogue and booklets on asbestos—learn how the shingles are made that last a life time without paint or repairs—clip the coupon and mail it **now.**

The Asbestos Mfg. Co., Ltd.
E. T. Bank Bldg., Montreal

Please send me your catalogue and booklets on Asbestos Shingles.

Name____________________
Address____________________
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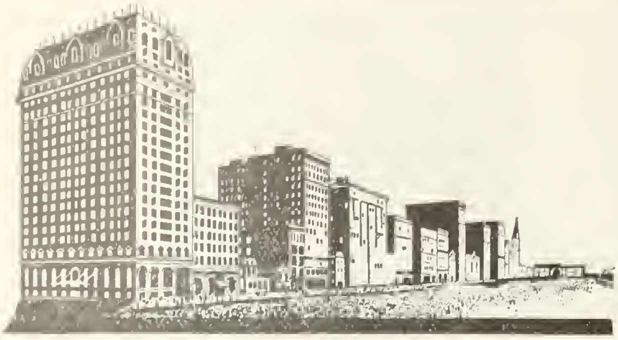
C. R.

THE ASBESTOS MFG. CO., LTD.

Eastern Townships Bank Bldg., Montreal
Factory at Lachine, P. Q.



Building Record

West ahead of the East by a big margin in 1911—Toronto has safe hold on premier position.

BUILDING PERMITS FOR YEAR

	1911	1910
Toronto, Ont.	$24,374,539	$21,127,783
Montreal, Que.	14.561,481	15,815,859
Winnipeg, Man..	17,550,000	15,106,480
Vancouver, B. C.	17,652,642	13,150,365
Ottawa, Ont.	2,997,610	3,022,350
Hamilton, Ont..	4,255,730	2,604,605
London, Ont.	1,036,880	805,074
Halifax, N. S.	508,796	630,380
Calgary, Alta.	12,909,478	5,589,594
St. John, N. B.	572,700	526,435
Victoria, B. C.	4.026,315	2,273,045
Regina, Sask.	5,099,340	2,351,238
Edmonton, Alta.	3,671,850	2,159,106
Kingston, Ont.	314,569	220,092
Maisonneuve, Que. ...	2,260,160	1,955,100
Peterboro, Ont.	345,372	517,958
Windsor, Ont.	739,575	392,040
Sydney, N. S.	495,642	347,554
Fort William, Ont. ...	3,078,010	2,381,125
Berlin, Ont.	358,095	347,550
Westmount, Que.	1,489,082	2,152,020
St. Thomas, Ont.	285,515	286,100
Brandon, Man.	1,043,929	982,385
Moose Jaw, Sask.	2,475,736	1,071,090
New Westminster, B.C.	1,058,400	
Saskatoon, Sask.	5,004,326	2,817,771
Port Arthur, Ont. .. .	597,705	892,681
Chatham, Ont.	233,000	....
Galt, Ont.	282,334	....
Belleville, Ont.	320,000	....
Woodstock, Ont.	143,200	82,000
Nanaimo, B. C.	152,611	....
Lethbridge, Alta.	1,033,380	2,211,310
North Vancouver, B.C.	772,468	....
St. Boniface, Man. .. .	1,140,735	861,870
Oshawa, Ont.	120,000	179,500
Strathcona, Alta.	491,403	363,470
Medicine Hat, Alta. ..	743,532	205,640
Welland, Ont.	342,808	245,942
Nelson, B. C.	166,700	163,430
	$131,886,775	$102,819,242

These figures show a gain of 28.2 per cent. over 1910. They give some idea of what we may expect this year. If you manufacture or sell anything that enters into the construction of buildings you should write to MacLean Daily Reports Limited, 220 King Street West, Toronto, and learn how they can help you help yourself. Their organization thoroughly covers the Dominion, and supplies news economically and efficiently, or present and prospective markets for the goods their subscribers sell. If requested they will gladly send specimen reports and rates and outline facilities for serving you.

SAVE 75 Cents a Day on Each Bricklayer

Possible with **Renfrew Lime** and you can lay 200 more bricks a day.

'Renfrew' will make more mortar per 100 lbs. of lime and it sets very hard.

Bricks are easily bedded down when **'Renfrew'** Lime is used.

Try it and be convinced.

'Renfrew' the Lime of Quality

Jamieson Lime Co.

RENFREW, ONTARIO

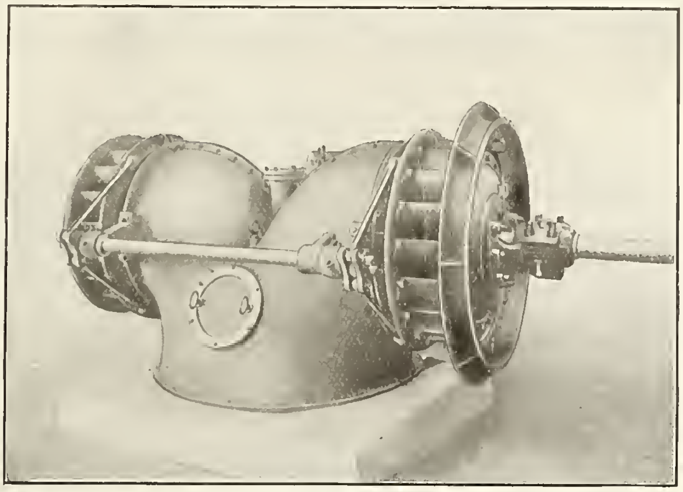
White Lime - Stone - Grey Lime

Brick - Drain Tile

WATER-POWER

Turbines for
High and Low
Pressure

Any Output



Governors of
any Capacity

Unequalled
Design

ESCHER WYSS & CO. - ZURICH, SWITZERLAND

CANADIAN HEAD OFFICE, 408 LUMSDEN BUILDING, TORONTO
PHONE, ADELAIDE 234

Representatives in British Columbia:
FRANK DARLING & CO., VANCOUVER

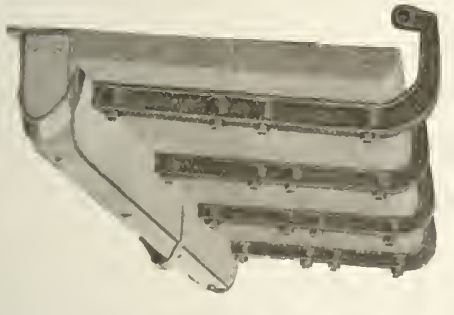
The Bottom Is Vital

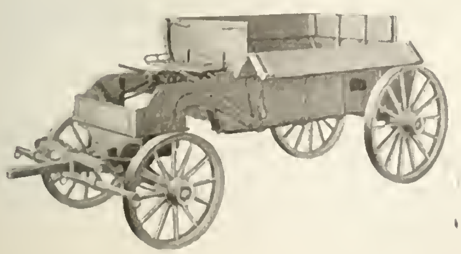
A dumping wagon is no stronger than its bottom. Watson bottoms are of wood for the very good reasons stated below.

Twelve years ago we tried out the all-steel dumping wagon bottom—or rather, our customers tried it out for us. It was not a success. Not because the steel bottom has no good points, but because it fell short in many ways. There's only one thing to do with a battered and twisted steel bottom, and that is to replace it with a new one.

Look at the Watson bottom shown here. You *can't* batter it out of shape. And the planks are independent of the bottom framework.

Notice the bottom hinges and braces. They are one and the same piece, and they reach clear across. That's why you see so many Watsons under steam shovels.





Get the Printed Matter. We can ship promptly.

Watson Wagon Company

The World's Largest Dumping Wagon Builders

Canastota, New York

Also Offices in NEW YORK PITTSBURGH PHILADELPHIA CHICAGO

The Aristocrat Among Bricks

HAMILTON PRESSED BRICK

St. Clair Block, built of Hamilton Pressed Brick. Robert Clohecy, Architect.

The growing popularity of Hamilton Pressed Brick is due to its uniform color and quality. In our clay deposits we have the ideal material for brick making—clay rich in iron oxide. Our long experience and modern plant enable us to make the most of our raw material.

Always specify "Hamilton Pressed Brick"

Hamilton Pressed Brick Company

Limited

Phones
Factory 1992
Office 2931
Residence 345

Spectator Building, Hamilton, Ont.

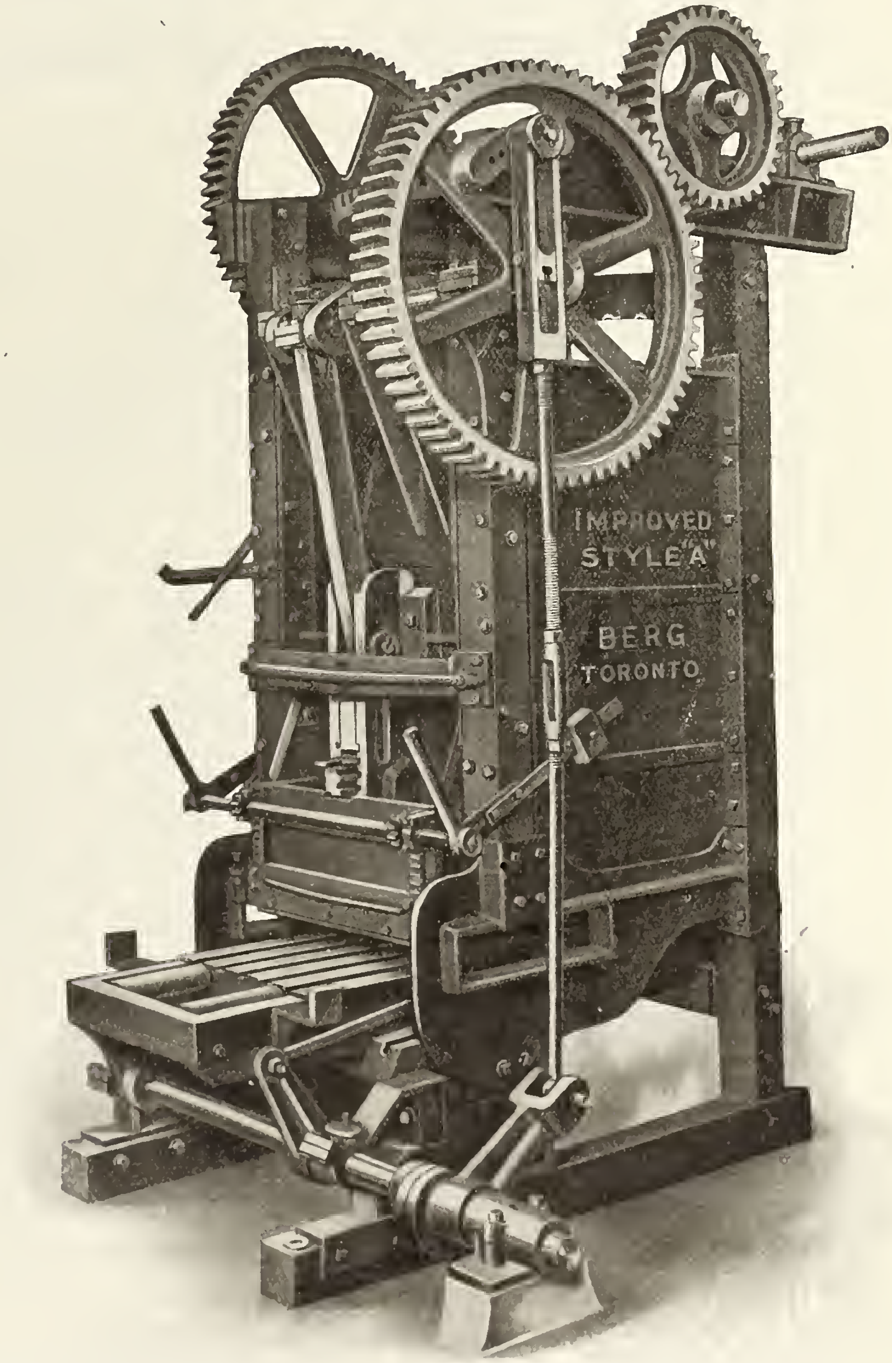
Toronto Representative, WALTER HUNTER, 105 MACDONELL AVE. Telephone Park 3170
Montreal, STINSON-REEB CO., Eastern Townships Bank Building.

BRICKMAKERS !

This is the Brick Machine you should have for the coming season.

HAS MANY IMPROVEMENTS AND ADDITIONAL STRENGTH

Improved Style "A" Power Brick Machine



We also make complete Machinery and Equipment. For making Dry-Press Brick, Wire-Cut Brick and Sand-Lime Brick.

WRITE US FOR PARTICULARS

The Berg Machinery Manufacturing Co.

Limited

Bathurst and Niagara Streets, TORONTO

What a Difference Between the Equitable and Singer Fires

The Equitable fire cost seven or more lives and quite a few millions of dollars.

The Singer fire (in the offices of the United States and Mexican Trust Company, on the 26th floor, September 29th, 1910) cost the furniture in the room in which the fire originated. What would have happened had not the Singer tower been totally fireproof, is obvious. The remaining sixteen stories above and others below would have been as susceptible to flames as the head of an enormous match.

The Singer fire extinguished itself — by consuming the inflammable contents confined at the point of the fire's origination. The fire did not, *could not*, spread, simply because it *could not* eat its way from room to room, or floor to floor.

This is the unit form of construction made possible by the origination and developing to their highest state of efficiency of

DAHLSTROM
Metallic Doors and Trim

The Singer Tower is equipped throughout with the Dahlstrom Products—doors, partitions, wainscoting, picture moulding and all necessary trim — are of STEEL, enameled and grained so perfectly as to deceive the best of wood experts.

Each office, or suite of offices, is virtually a building in itself. A fire may occur in dozens of them at the same time and on various floors, but the safety of the structure is not affected. The most that any of the fires can do is to consume only the contents of the units in which they first occur.

The difference between the Equitable and Singer fires is the difference in building.

Remember that as long as you erect fire-inviting buildings nothing but their ultimate destruction can be expected.

It seems that there should be ample food for thought in these two fires — for architect, owner, builder, and tenant.

We are the originators of "steel interiors" and have developed them to their highest state of efficiency. Our factories are the largest of their kind in the world. The Dahlstrom Products are to be found in the more modern structures throughout the country, the battleships Florida and Utah, and so on.

DAHLSTROM
PATENT DOOR
ARTISTIC
EVERLASTING
SANITARY AND FIREPROOF

Complete literature and particulars upon request.

DAHLSTROM METALLIC DOOR COMPANY
The Dahlstrom Products
Executive Offices and Factories: 48 Blackstone Ave., Jamestown, N. Y.
Branch Offices in All Principal Cities

THOS. & WM. SMITH, LD.,
WIRE ROPE MANUFACTURERS,
NEWCASTLE-ON-TYNE, ENGLAND.

ELECTRIC CABLEWAY OVER THE ZAMBESI RIVER AT THE VICTORIA FALLS.
Span, 870 feet. Working Load, 10 tons. Main Cable 8½" circ. Breaking Stress of Main Cable, 275 tons.
Main Cable supplied by THOS & WM SMITH LTD., Newcastle-on-Tyne.

HIGH-CLASS WIRE ROPES
For CONTRACTORS' WORK, such as BLONDINS, CRANES, INCLINES, BALLAST ROPES,
&c., &c., and all classes of work requiring Wire Ropes.

AGENTS IN CANADA:
Evans, Coleman & Evans, Ltd., Vancouver. Angel Engineering & Supply Co. Ltd., St. John's, N.F.
Baines and Peckover, Toronto.

REPRESENTATIVE FOR CANADA:
D. W. CLARK, P.O. Box 431 MONTREAL, QUE.

USE ONLY SMITH'S "RED THREAD" WIRE ROPES.

THE H. & E. PATENT BALL-BEARING LIFTING JACKS

For Railway and Bridge Work, Contractors and Builders' Use

Made by practical Jack Builders. Material: best grades of malleable iron and steel Fully guaranteed as to durability and efficiency. The long even stroke of the lever together with the design and careful construction of the jack, makes it the quickest and easiest working lifting appliance on the market. Made in plain and foot-lift styles. Adapted to all classes of work where a lifting jack can be used. Sizes from 8 to 50 tons capacity now complete. Send for prices and discounts.

To any responsible Firm or Railway in Canada any of these jacks will be sent on 30 days trial.

MANUFACTURED BY

H. & E. Lifting Jack Company

Waterville, Que.

Stock carried by F. H. Hopkins & Company, Montreal

This Fountain is Waterproofed With Ceresit

Fountain in the Country Life Gardens, Garden City, Long Island, N.Y.

Ceresit is a cream white paste which is dissolved readily in the water used in mixing concrete or cement mortar. By this method the Ceresit is uniformly distributed through the aggregates, thus filling the voids and giving greater density and strength to the concrete and mortar, and rendering it absolutely impervious to water or dampness even when subjected to great hydrostatic pressure.

"Ceresit" Waterproofing

Ceresit acts as a protector to concrete and cement—by keeping the materials dry it prevents disintegration by frost.

Ceresit itself cannot crack or be chipped off as it is an integral part of the mass. It therefore has a quality of permanence not possessed by mere coatings or paints, which at best are cheap substitutes that prove costly in the final test of time. Ceresit is economical in labor, requiring no extra mechanical apparatus or mixer. Ordinary workmen can mix Ceresit by the simple directions that always accompany the product.

Ceresit does not darken the concrete or cement, but it does give it strength. We guarantee Ceresit to be an efficient waterproofing for any job we undertake and direct, and to prove our faith we will put up a cash bond if needed.

CERESIT WATERPROOFING CO.

Commercial Bank Bldg., CHICAGO

Ceresit Factories are located in Chicago, Unna Westphalia, Germany.
London, Paris, Vienna, St. Petersburg.

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Carritte-Paterson Co., Ltd., St. John, N.B.
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All we ask is that you give Ceresit a fair trial. It will not disappoint the most exacting architect, engineer, contractor or owner.

Ceresit is Catalogued in "Sweet's" Index

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REMINDER

to write for Free Book "S" on **WATERPROOFING** to

Ceresit Waterproofing Co.
Commercial Bank Bldg.,
CHICAGO (7)

Galvanized Wire Wound and Continuous Stave Wooden Pipe

FOR
Municipal and Private Water Supply
Direct Pumping or Gravity Systems
Power Lines, Irrigation and Mines

WILL NOT
Rust, Rot, Burst, Freeze or Taint

Withstands 200 lbs. Working Pressure
Unaffected by Acids or Minerals

Tanks, Water Works Supplies, Complete Water Systems Installed

WRITE US

The EASTERN PIPE AND CONSTRUCTION COMPANY, LIMITED, Alexandria, Ontario

A Ready-to-Lay Roofing Made of Solid Rock Fibres

NATIONAL IRON WORKS, TORONTO, ONT.
Covered with J-M ASBESTOS ROOFING.

J-M Asbestos Ready Roofing is literally made of solid rock fibres.

Its base consists of felt made of *stone*—pure *Asbestos*. And Asbestos is a natural *rock* formation. Like all rock or stone, practically everlasting. And known the world over as fire-proof. It is the same material that is used to hold the flame in gas grates — the same material of which we make Asbestos Theatre Curtains. You know Asbestos Curtains are required by law, as protection against fire, in the Theatres of nearly all cities.

So no wonder this Asbestos or *stone* roofing never catches fire, even when neighboring buildings burn to the ground.

J-M ASBESTOS ROOFING

Won't Burn---Won't Rot or Decay---Needs No Coating

We use several layers of this Asbestos or stone felt. And cement them together with genuine Trinidad Lake Asphalt—that wonderful MINERAL cement which, in Asphalt pavements, stands the grinding of wheels and the hammering of hoofs for 30 or 40 years.

With such indestructible materials as these, do you wonder that J-M Asbestos Roofing often outlasts the building it covers.

And do you wonder that this ALL-MINERAL ROOFING will never need a single cent's worth of paint to keep it from rotting, decaying or otherwise deteriorating.

We'll sell you J-M Asbestos Roofing direct from our nearest Branch if your dealer won't supply you.

Write Nearest Branch for Samples and Catalog No. 303

THE CANADIAN H. W. JOHNS-MANVILLE CO., LTD.

Manufacturers of Asbestos and Magnesia Products — ASBESTOS — Asbestos Roofings, Packings, Electrical Supplies, Etc.

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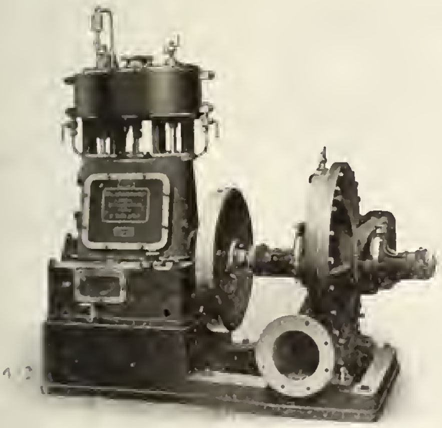
FOR

Centrifugal and Turbine Pumps for Water and Sewage Works



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Correspondence with reference to 1912 work solicited.

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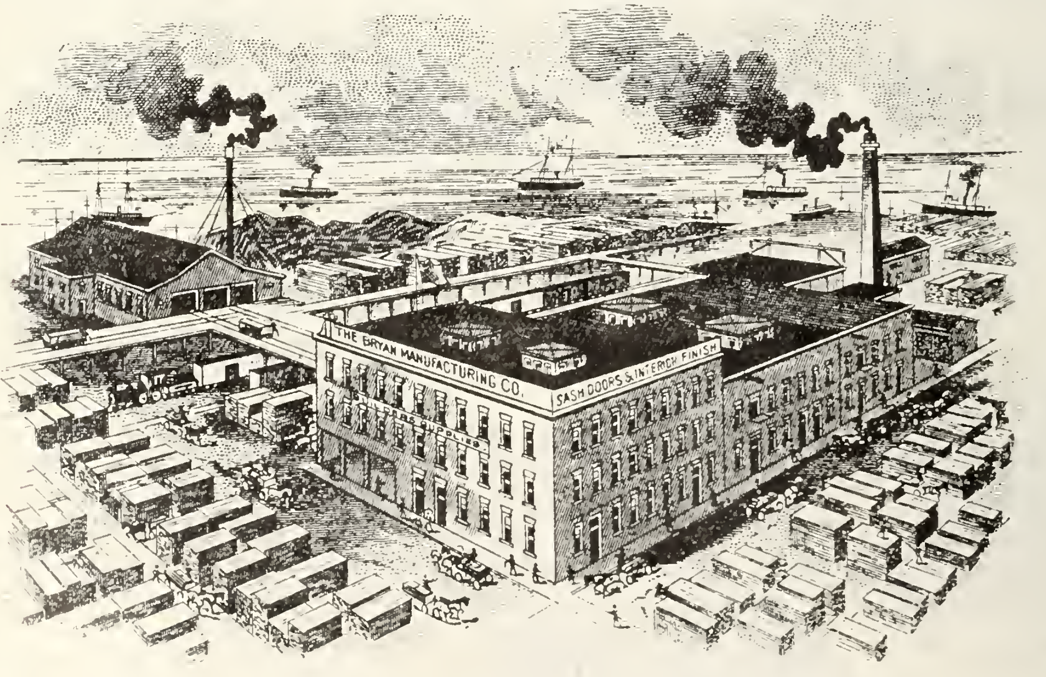

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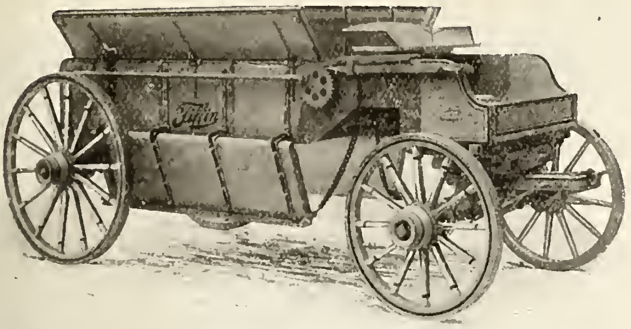

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Flushing Machines
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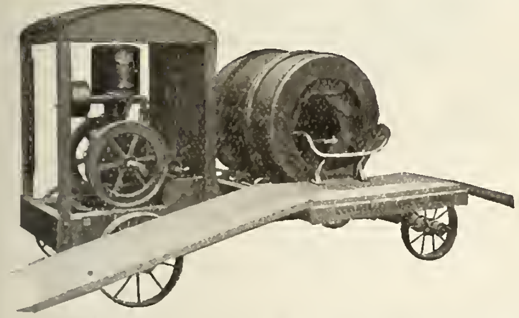
The TIFFIN WAGON CO., Tiffin, Ohio



Why Not

Save 1-3 of the first cost of your mixer?

Not a theoretical saving but an actual saving in dollars and cents.

Get a collection of *high charging* mixer catalogs and study them from the *economy* standpoint. You will find they are very careful to recommend a *charging elevator* with nearly every machine. The fact is, on *nine jobs out of ten* they are only economical when *equipped with* a charging devise. Now make a careful comparison of the price lists and you will find the *price averages one-third more* for the charging contraption.

You save every cent of this useless expenditure, not in theory but in actual money, as proved by the price lists, by buying the low charging direct from barrows.

"THE STANDARD" CONCRETE MIXER.

But this does not begin to tell the story.

It requires one-third to one-half more power to operate the charging device.

It requires an extra high priced man to operate it.

The entire complicated mechanism of a mixer—the part that is always getting out of order and causing no end of expense and trouble—is the very part required to operate this charging elevator.

That includes the fricton clutch. Do you know what genuine clutch troubles really are?

You save every cent of this expense, and all the annoyance you buy with it, by purchasing "The Standard" mixer.

The charging platform is only 2 feet above the ground.

Both the charging platform and inclined runways are a part of the mixer, moved with it and set up ready for work in a moments time.

Now sharpen your pencil and figure.

One-third of the cost is an item worth considering.

That means not only one third more money in first cost but one-third more interest on your investment

It often means the difference between a profitable investment and a prohibitive price to the small contractor; It's an economy the biggest contractor cannot afford to overlook.

And remember this "**The Standard**" mixer is a perfect mixer, unexcelled in quality of output or quantity of work performed by any other mixer.

It's saving money for the biggest contractors in the business. Do a little investigating and it will save money for you. Complete new catalog No. 245, by first mail if you say so.

The Standard Scale and Supply Co.,

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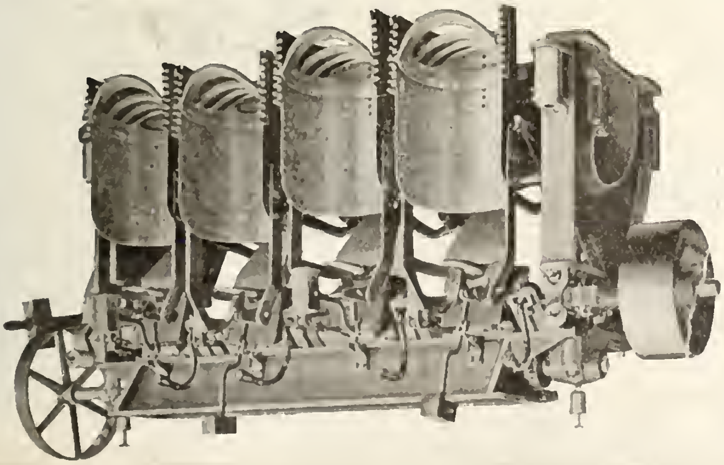
150 T of Hydrate Sacked per 10 hr. day with this machine



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Let Us Pack Your Hydrate with the Wonderful

BATES SYSTEM

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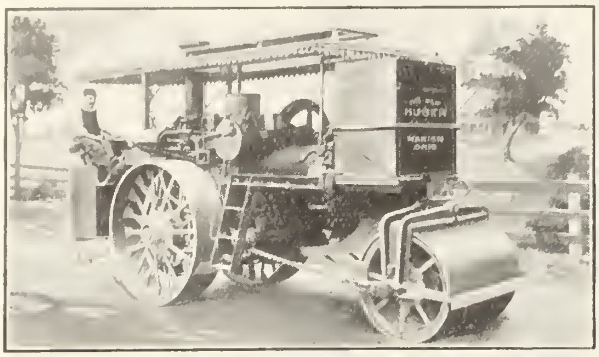
HUBER ROLLER



A Power Steered Roller. Guided by a straight lever from either side of platform. The easiest and quickest control on any roller.

Engine mounted on the economical and powerful Huber return flue boiler.

Operates on the minimum of fuel and water.

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Owen Bucket

is an all round bucket, built to stand hard usage. It will handle any material from sand to crushed rock.

The Owen Bucket will dig like a steam shovel and is provided with detachable teeth for dredging.

Write for our catalogue fully descriptive and a positive guarantee with every bucket.

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Copper, Iron and Aluminum

RUBBER COVERED WIRES AND CABLES

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With Weatherproof Insulation

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Slow Burning Weatherproof Wire

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That do not warp, sag or crack

Midland Brand

Our Doors are made from select material and by expert workmen. Modern facilities and careful attention to details enable us to satisfy you in price and quality.

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"Some Equipment With Merit"

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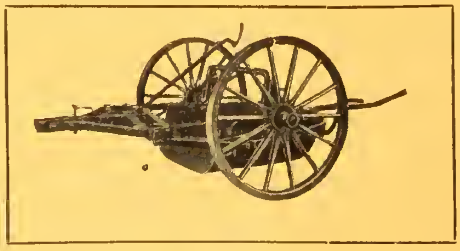

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are the very best that can be purchased anywhere. They are the only perfect wheelscraper. The best, strongest and easiest working Scraper ever put on the market.

We carry a full stock of all sizes for immediate shipment.

"Columbus" Scraper.

"K & J" DRAG SCRAPERS

in all sizes

"Boss" Scraper.

Our Scrapers are the leading Drag Scrapers everywhere. All our Scrapers are absolutely seamless throughout and are superior to any others upon the market.

We want your inquiry when in the market—Prompt shipment from stock

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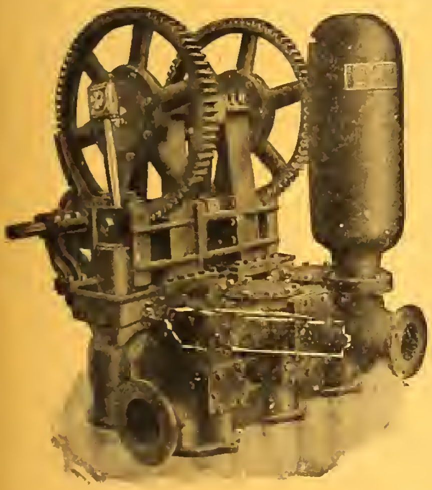
Vol. 26 Toronto, March 13, 1912 No. 11

ESTABLISHED 1886

Contract Record and Engineering Review



We Manufacture Steam and Power Pumps, Condensers, Travelling Cranes, Etc.

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Bent Glass

Made in all Kinds of Glass on Short Notice

Large Bent Plate Glass for Shop Fronts a Specialty

The Toronto Plate Glass Importing Company, Limited
(HILL & RUTHERFORD, Managing Directors)
Head Office and Works: 91 to 133 Don Roadway
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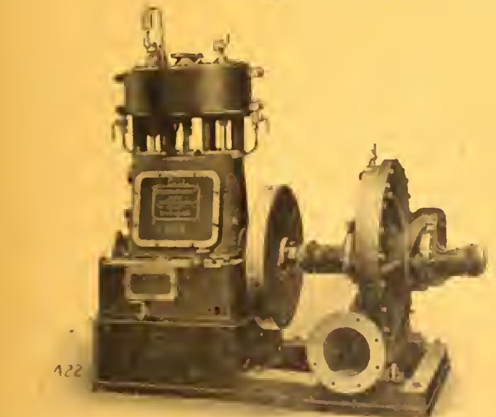
Belliss & Morcom Engines
FOR
Centrifugal and Turbine Pumps for Water and Sewage Works



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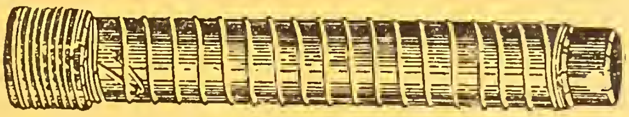

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RESERVOIR TANKS

for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

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Full Particulars and Estimates Furnished

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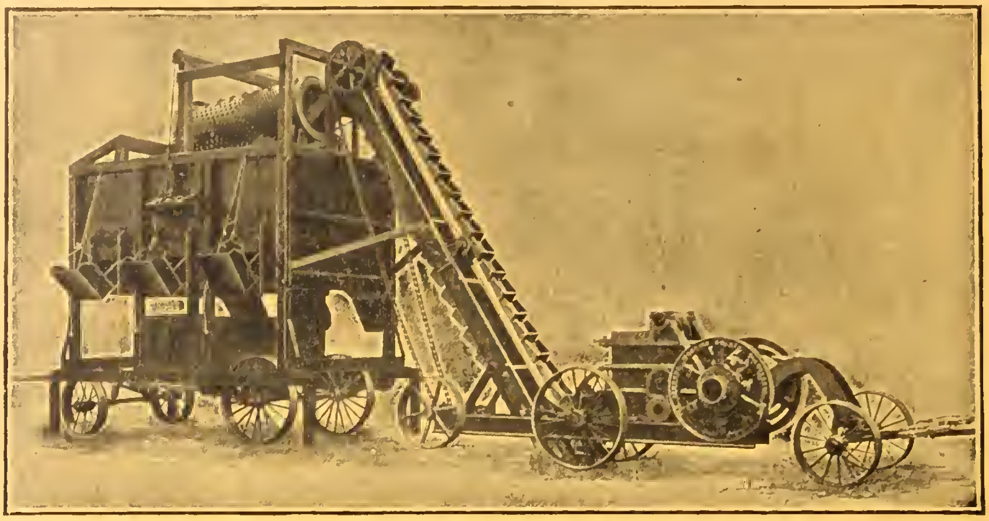

Capacity 150 tons in 10 hours.

Size of Crusher 9″ x 16. Will crush to 1½″.

Complete

Crushing Plants

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We have been in the crusher business for years, and our past experience is at your disposal.

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EVERY JOLT AND JAR

of a heavily loaded derrick produces thousands of pounds of stress on certain parts.

"AMERICAN" DERRICKS

ARE SAFE AND STRONG

They are designed by skillful engineers and built of material that for 28 years has stood the severest shocks and strains.

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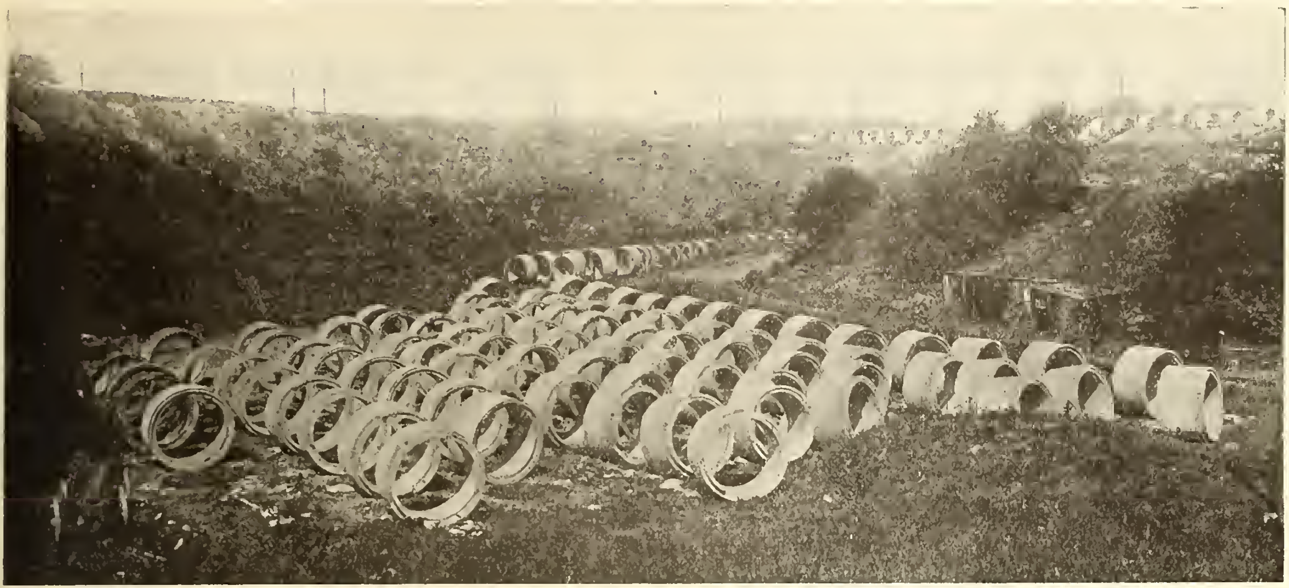

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If It Passes Our Tests, It Will Meet Your Needs

There is no longer any question about the suitability of concrete for the making of sewer pipes, drains or any work that has to withstand the corrosive effects of acids or the damages inflicted by frost and water.

Reinforced concrete, **properly made,** has been successful in the most rigid tests and is now the recognized material for all important work.

Properly made concrete, means, not only thoroughly mixed and the right proportions of cement, aggregate and sand—it also means that the cement used, be of the highest standard of purity.

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THE REINFORCED CONCRETE PIPE CO. report that although they have, on one piece of work, used cement from no less than five of our mills, they could see no difference in the quality of the cement or in the work produced. That is what the "Canada" Brand stands for:—absolute purity and absolute uniformity.

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Morse Diving Apparatus is Standard and Up-to-date

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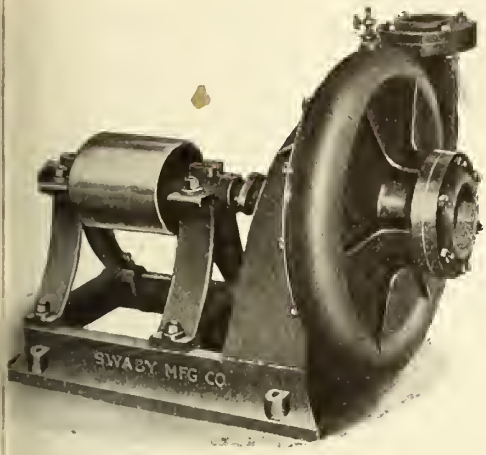

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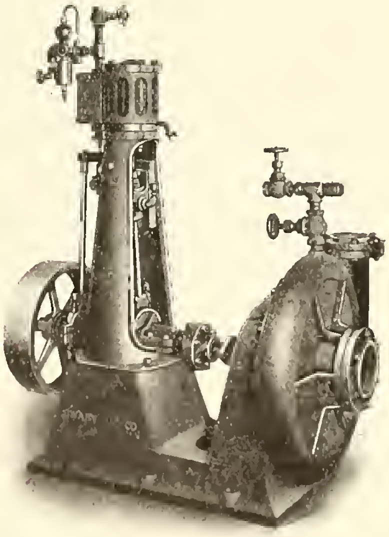
(Single and Double Acting)

Complete Line of Supplies



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(Continued on page 12)

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Residence of Mr. J. C. Eaton, Toronto. **Messrs. Wickson & Gregg, Architects**

Don Valley Porous Terra Cotta Fire Proofing, Foundation Bricks, Facing Bricks and Enameled Bricks Exclusively Were Used in This Structure

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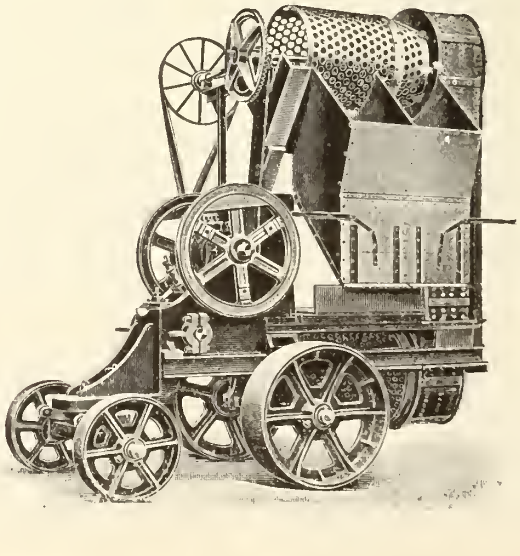
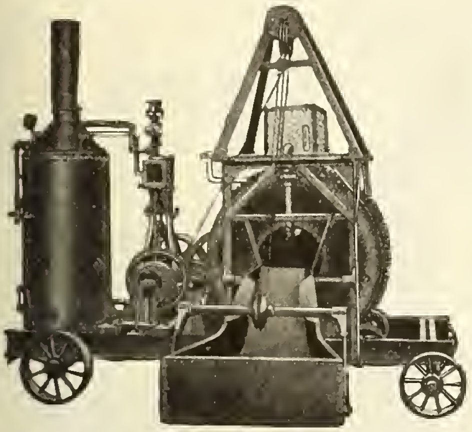


Concrete Mixers


London Standard Drum Batch Mixer

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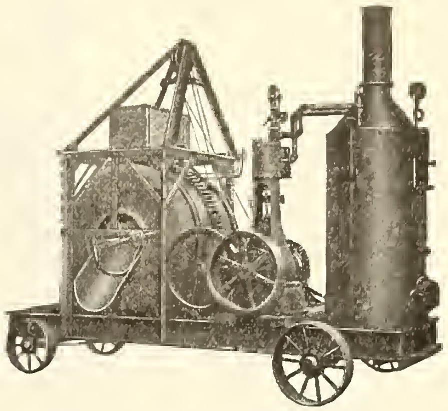
London Standard Drum Batch Mixer

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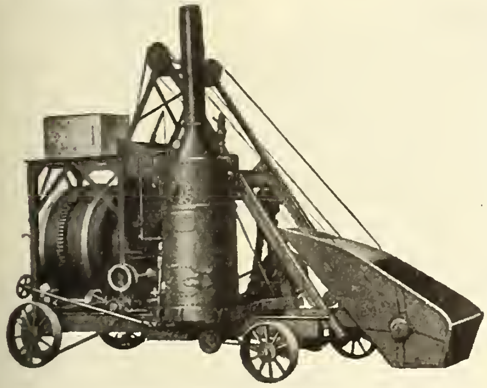
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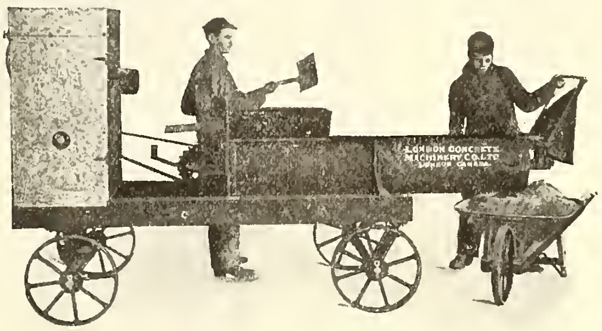

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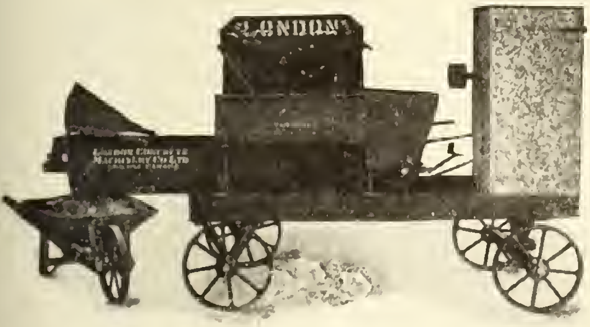

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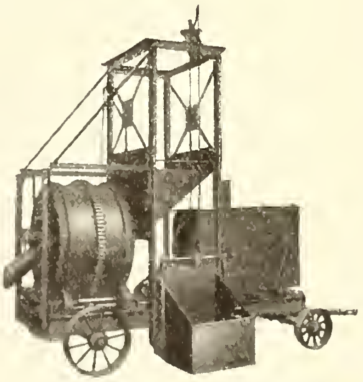
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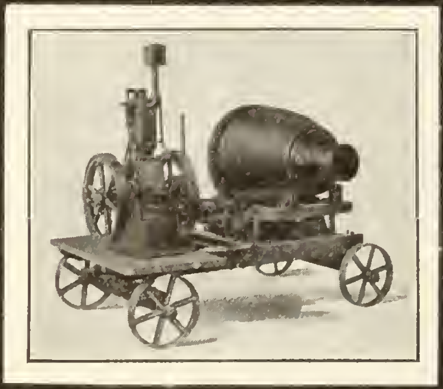

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It will not clog or corrode.
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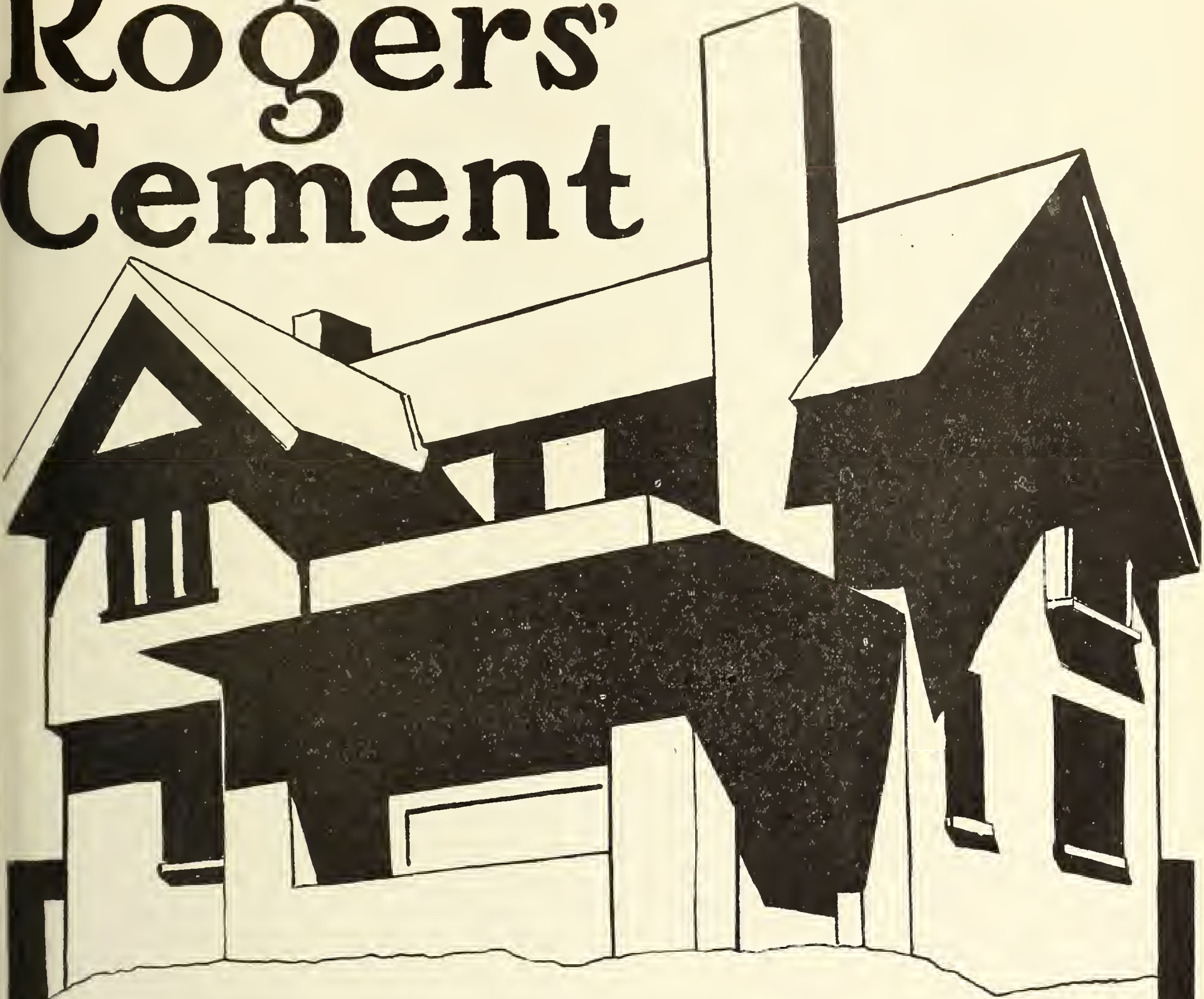

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- Pumps and Pumping Machinery (Continued from page 6)
  - Mussens Limited
  - Ontario Wind Eng. & Pump Co.
  - Smart-Turner Machine Co.
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  - Johnson & Chapman Company
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  - Dominion Sewer Pipe Co.
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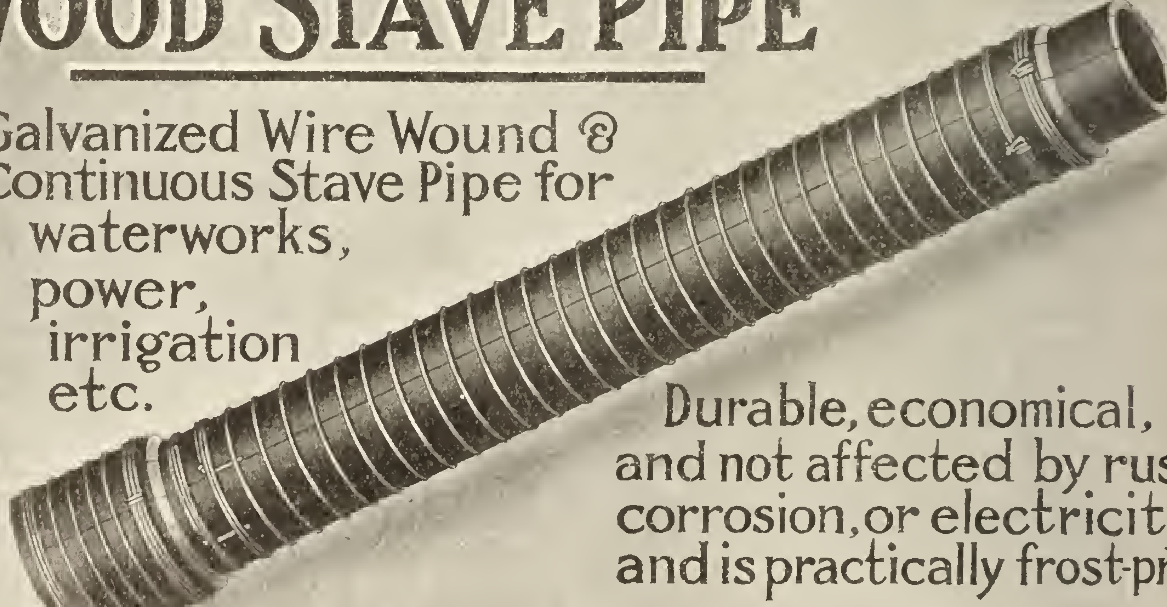

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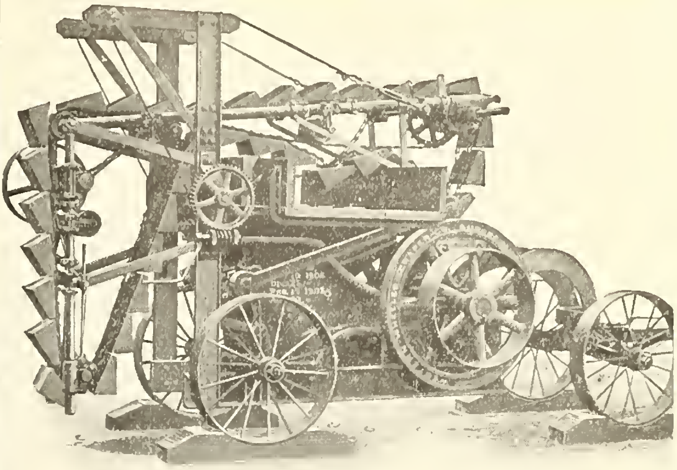

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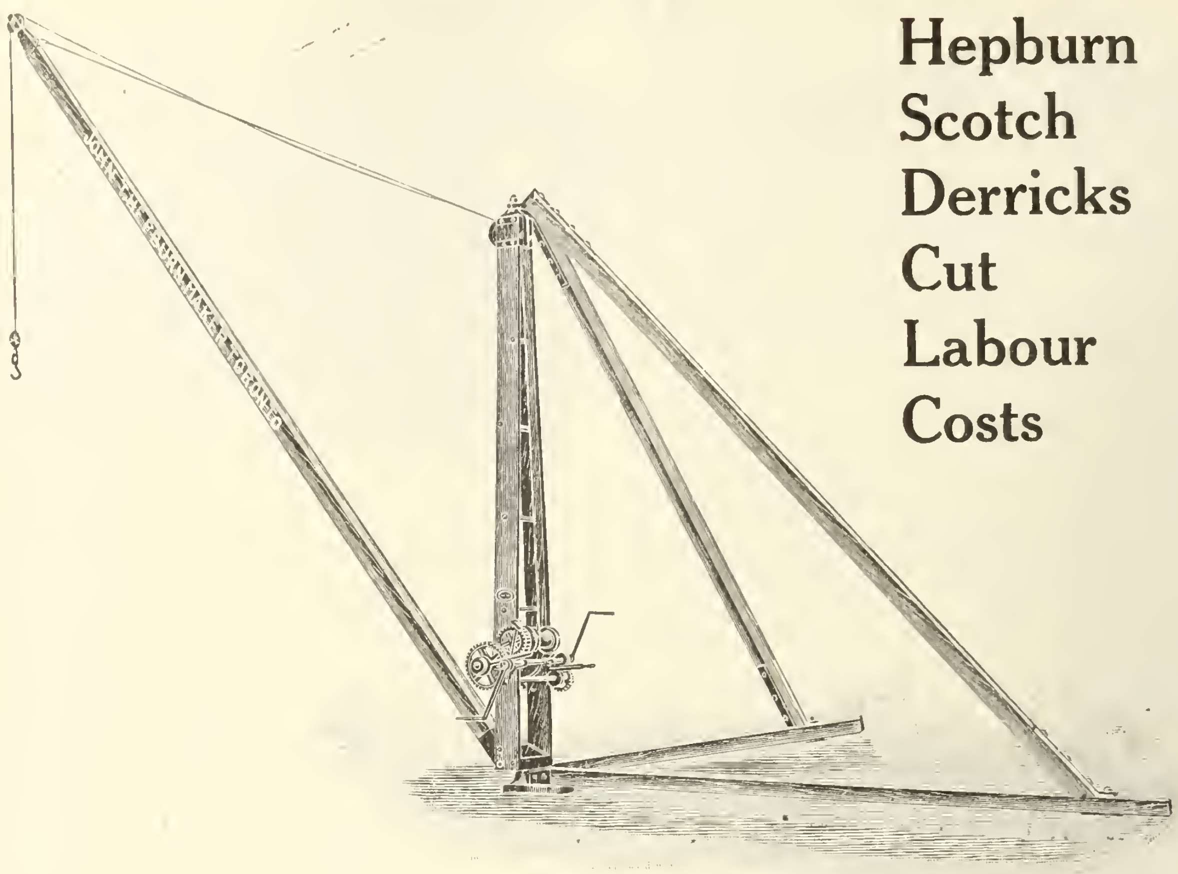

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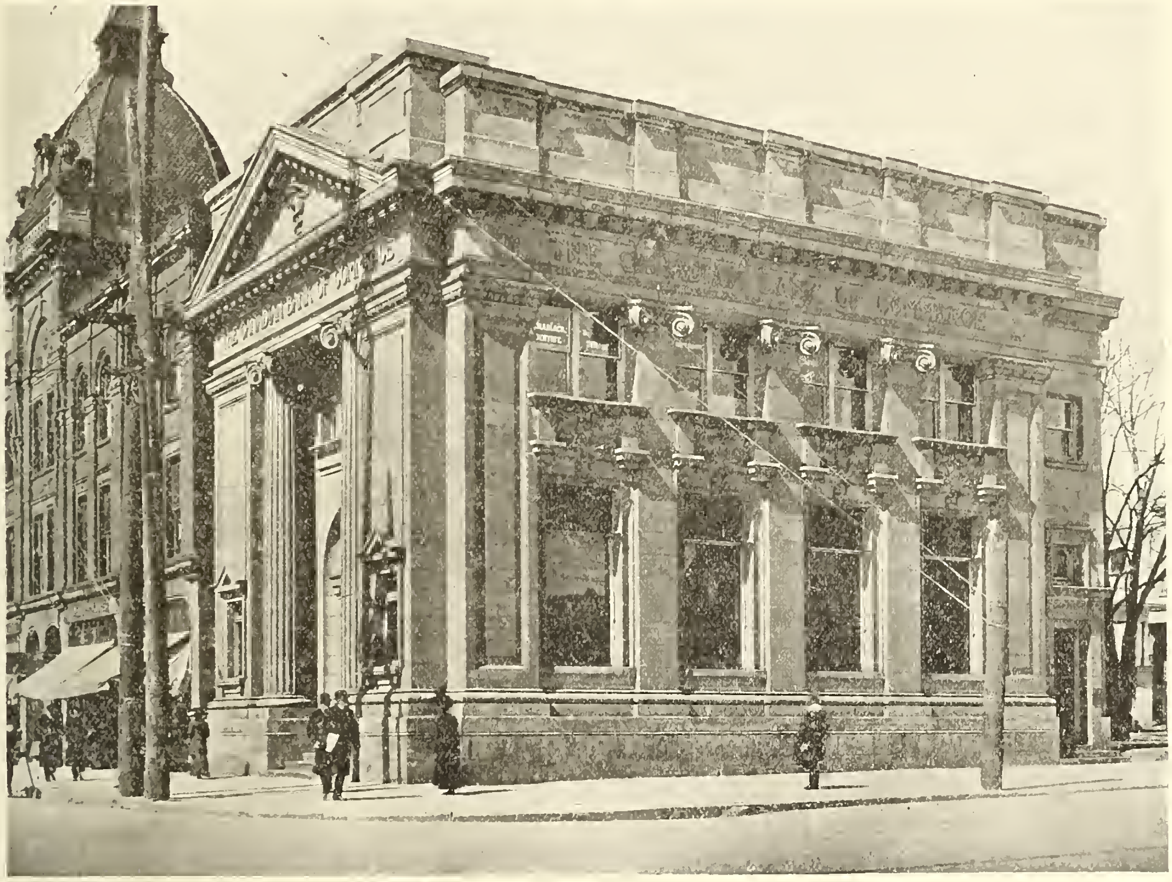

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Alsen's American Portland Cement Works.	78
Ambursen Hydraulic Construction Company of Canada, Limited	102
American Enameled Brick & Tile Co.	82
American Hoist & Derrick Co.	2
American Spiral Pipe Works	79
American Surety Company	82
American Water Softener Company	94
American Well Works	107
Anderson & Co., 1905 Ltd., George	22
Andresen, H. P.	13
Asbestos Mfg. Co.	99
Austen Drainage	28
Automatic Wood Box & Turning Co.	82
Bain & Ross	92
Bates & Edmonds Motor Co.	23
Batts Limited	109
Beatty & Sons Limited, M.	79
Beckman Company, L.	84
Bell Filtration Co. of Canada, Ltd.	23
Bennett, Robert	98
Berg Manufacturing Company	
Blystone Manufacturing Company	99
Bowman & Connor	92
Bremner Limited, Alex.	91
Briscall, William	101
Britnell & Co., Ltd.	86
Brodie & Company, James	
Brown Hoisting Machinery Co.	83
Browning Engineering Company	
Buffalo Meter Company	27
Business Systems Limited	95
Bryan Manufacturing Company	
Cabot, Samuel	101
Canada Cement Company, Ltd.	3
Canada Foundry Co., Ltd.	20-77-97
Canada Iron Corporation Limited	91
Canada Steel Company	31
Canadian Store Front Company	85
Canada Wire & Cable Company	23
Canada Wire & Iron Goods Co.	100
Canadian Boving Company	30
Canadian Bridge Co., Ltd.	88
Canadian Fairbanks-Morse Co., Ltd.	22
Canadian Kellogg Company	35
Canadian Office and School Furniture Company, Limited	87
Canadian Norcross Bros. Co.	18
Canadian Pipe Company, Limited	90
Canadian Rand Company, Limited	34
Canadian Supply Company	28
Cement Era Publishing Company	
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Cleveland Bridge & Engineering Co., Ltd.	88
Cleveland & Erie Mach. Co.	87
Cloisonne Glass Limited	100
Colonial Glass Co. of Canada	100
Cook, A. D.	98
Commercial, The	87
Conduits Company, Limited	91
Consolidated Glass Company	
Consumers' Gas Company	104
Consolidated Optical Co., Ltd.	103
Consolidated Stone Company	94
Contractors' Supply Co., Ltd.	86
Corinthian Stone Company	24
Cream City Equipment Company	94
Crushed Stone Limited	95
Dahlstrom Metallic Door Company	86
Dennis Wire & Iron Works Co., Ltd.	90
Des Moines Bridge & Iron Co.	79
Dickson Bridge Works Co., Ltd.	96
Doolittle & Wilcox, Limited	91
Dominion Bridge Co., Limited	88
Dominion Concrete Company	84
Dominion Creosoting Company	80
Dominion Marble Company, Ltd.	21
Dominion Sewer Pipe Co., Ltd.	21
Dominion Wood Pipe Co., Limited	12
Don Valley Brick Works	7
Down Draft Furnace Company	98
East Iron & Machine Company	78
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Elaterite Paint Company	
Eastern Pipe & Construction Co., Ltd.	106
Eaton & Co., T.	
Erie Machine Shops	94
Factory Products Limited	35
Farmer, John T.	92
Ferguson, H. S.	92
Ford Iron Company, Limited	8
Foundation Company	
Fuce, Edward O.	92
Galt Art Metal Company, Limited	84
Galt Engineering Co., John	92
Garlock Packing Company	
Gartshore, John J.	92
Gartshore-Thompson Pipe & Foundry Company, Limited	90
General Machinery Co., Limited	98
Georgian Bay Shook Mills, Limited	
Gibb, Alexander	98
Goodyear Tire & Rubber Co. of Canada, Ltd.	33
Greening Wire Co., Ltd., B.	105
Guarantee Company of North America	92
Gurley, W. & L. E.	85
Hagersville Contracting Co., Ltd.	13
Hamilton Pressed Brick Company	
Hamilton Machinery Company, Limited	26
Hancock, Jr., H. Syd.	92
Harvey, J.	87
Heinicke Inc., H. R.	
H. & E. Lifting Jack Company	106
Hepburn, John T.	14
Hobbs Manufacturing Co., Ltd.	100
Holmes & Sons, Fred	79
Hopkins & Company, F. H.	112
Hotchkiss Lock Metal Form Co.	26
Huber Manufacturing Company	101
Hunt & Company, Robert W.	92
Hunter Bridge & Boiler Co., Ltd.	89
Imperial Wire & Cable Co., Ltd.	111
Improved Equipment Company	25
Inglis Company, John	75
International Marine Signal Co., Ltd.	29
Jamieson Lime Company	
Jenckes Machine Company, Limited	2
Johnston, A. H.	101
Johnston & Chapman Company	
Kennedy, James C.	92
Kerr Engine Company, Limited	
Koehring Machine Co.	32
Laurentian Granite Co., Ltd.	92
Laurie & Lamb	1
Lea, R. S.	92
Leach Concrete Company	
Leonard & Sons, E.	95
London Concrete Machinery Co., Ltd.	9
London Gas Power Company, Ltd.	76
Luxfer Prism Company	105
Mace, T. Harry	92
MacKinnon Holmes & Co., Ltd.	
MacLean Daily Reports	100
Marsh & Henthorn Limited	76
McCoy Company, Henry J.	25
McDougall Claedonian Iron Wks. Co., John	77
Mahan & Company	110
McMillan & Son, W.	110
McNally & Company, William	89
Meadows, George B.	35
Metallic Roofing Company, Limited	76
Metropolitan Paving Bricks Co.	31
Miller & Company, George M.	
Mitchell Company, Ltd., Robert	88
Missisquoi Marble Co., Ltd.	82
Montreal Locomotive Works, Ltd.	95
Morrison & Co., T. A.	92
Munderloh & Co., Ltd.	13
Mussens Limited	4
Myers, Oakley	95
Municipal Engineering & Contracting Co.	
National Bridge Co., of Canada, Ltd.	89
National Iron Works Limited	91
Neptune Meter Company	27
Noble, Clarence W.	78
Northwestern Terra Cotta Company	83
Ontario Asphalt Block Co., Limited	78
Ontario Lime Association Limited	81
Ontario Sewer Pipe Co., Ltd.	20
Ontario Wind Engine & Pump Co., Ltd.	95
Ormsby, Limited, A. E.	17
Oshawa Interior Fittings Co.	96
Owen Bucket Company	106
Pacific Coast Pipe Company, Limited	1
Page Wire Fence Company, Ltd.	83
Pedlar People Limited	110
Phoenix Bridge & Iron Works, Limited	89
Piggott & Company, Thos.	106
Port Credit Brick Co., Ltd.	90
Power & Son	
"Prime White" Road Oil Company	101
Pyle-National Electric Headlight Co.	19
Queenstown Quarry Co., Ltd.	91
Reid & Brown.	92
Rhodes Curry Company, Limited	76
"R. I. W." Damp Resisting Paint Co.	19
Rogers Limited, Alfred	11
Roman Stone Co., Limited	15
Sackville Freestone Company, Ltd.	29
Sand & Supplies, Limited	89
Sarnia Bridge Company, Limited	89
Sheppard & Sons, James	
Slack, T.	92
Smart-Turner Machine Co., Ltd.	1
Smith, Limited, Thomas & William	
Smyth & Ryan	96
Standard Drain Pipe Co., Ltd.	21
Standard Foundry & Machine Company	
Standard Ideal Company, Limited	36
Standard Scale & Supply Company	
Steel Company of Canada	30
Steward, A. P.	74
Stinson-Reeb Builders' Supply Co.	36
Sturtevant, B. F.	100
Taylor, J. & J.	96
Tide Water Iron Works	81
Thew Automatic Shovel Co., The.	31
Thompson & Co., B. & S. H.	21
Tiffin Wagon Company	
Toledo Wheelbarrow Company	96
Toronto Furnace & Crematory Co.	
Toronto Plate Glass Importing Co., Ltd.	1-83
Trussed Concrete Steel Company	82
Turner, C. A. P.	104
Turner & Sons, J. J.	99
Union Water Meter Co.	27
Universal Crusher Company	26
Urschel Bates & Company	
Vulcan Iron Works	94
Wadsworth Howland & Co., Inc.	79
Waterous Engine Works Co., Ltd.	81
Watson Wagon Company	
Watts & Son, E. R.	32
Weeks, Arthur L.	92
Wells & Gray, Limited	
Western Canada Contractor	86
Western Wheeled Scraper Company	13
Wettlaufer Bros.	10
Whitehead & Co., Ltd., John	111
Wilson Bros., Ltd.	102
Woods Limited	27
York Sand & Gravel Co.	86

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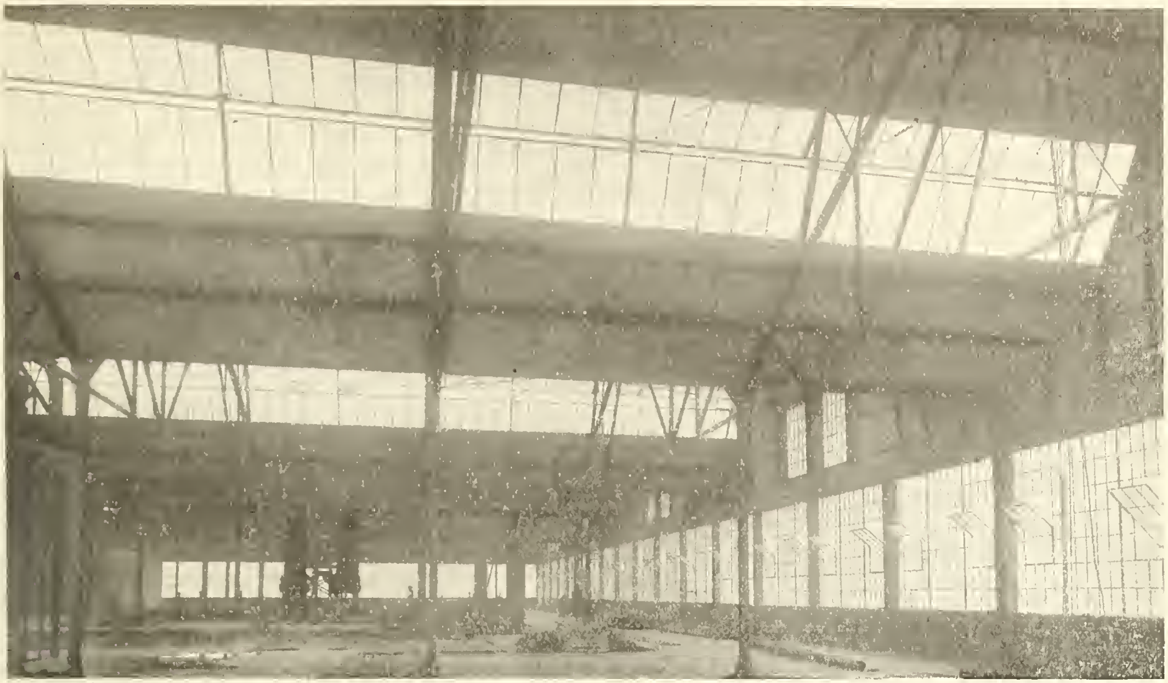

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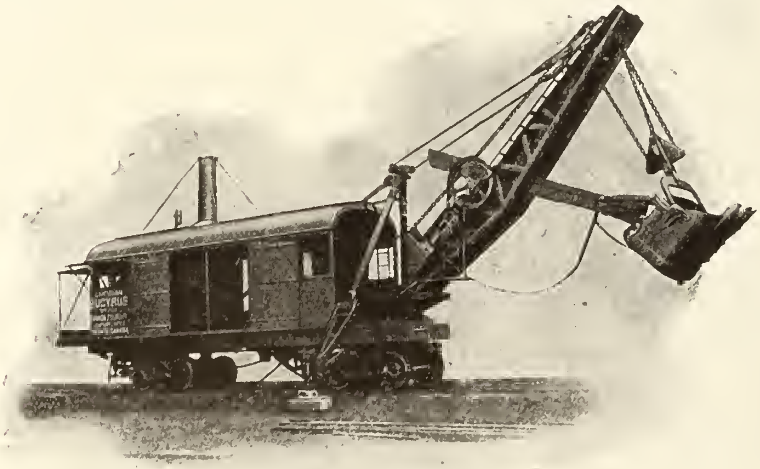

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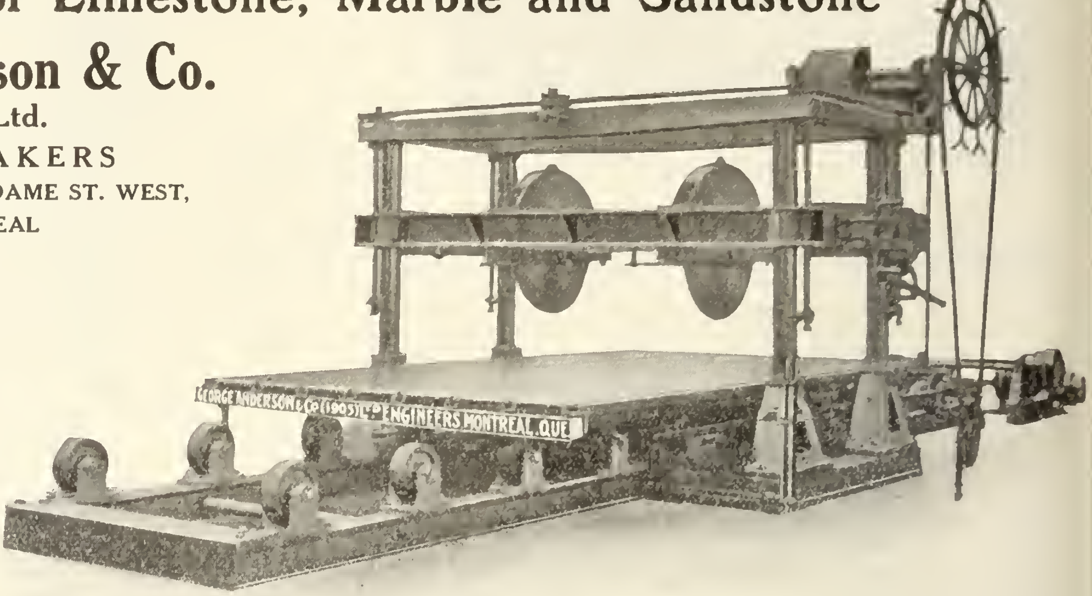

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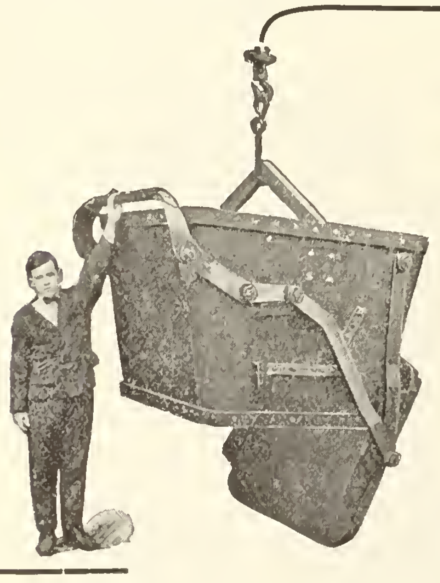

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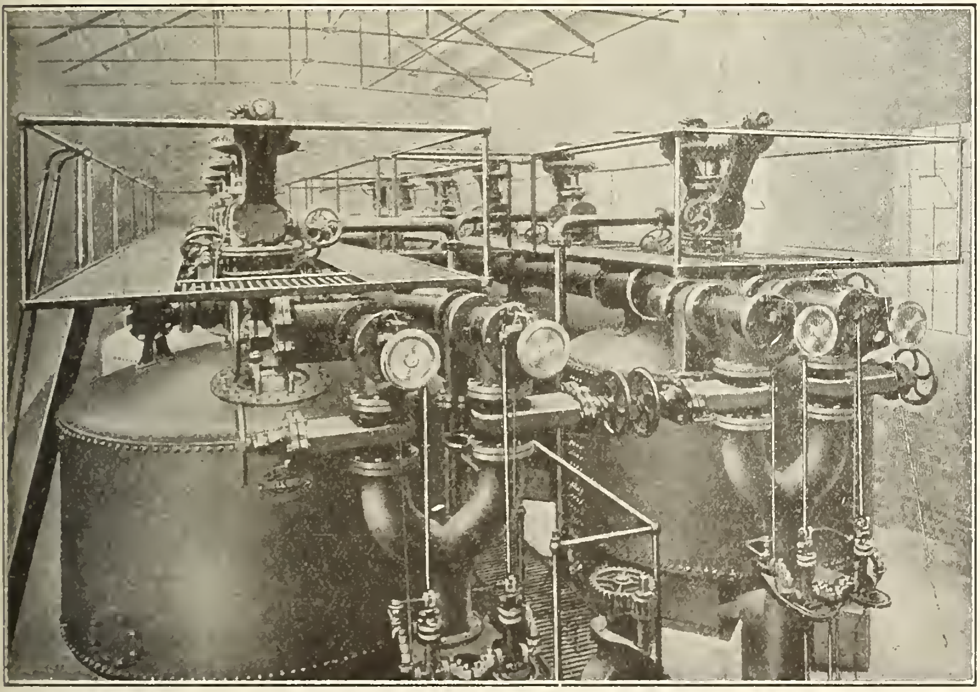

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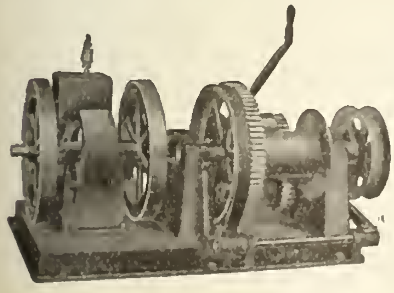

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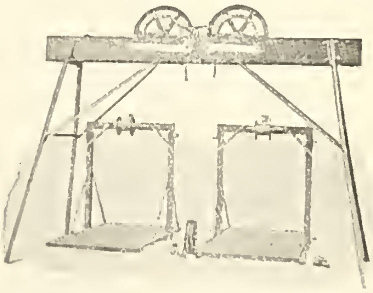

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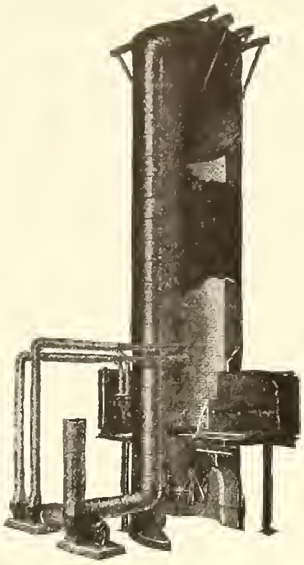

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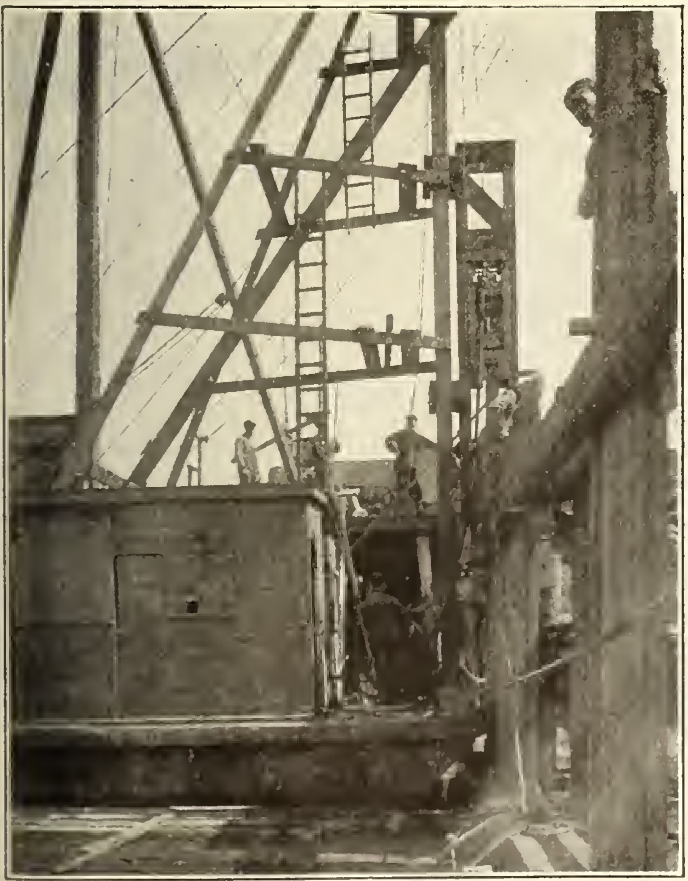

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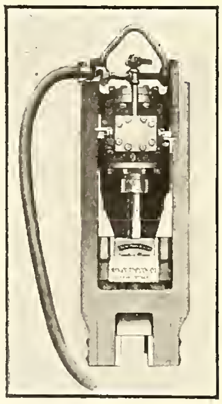

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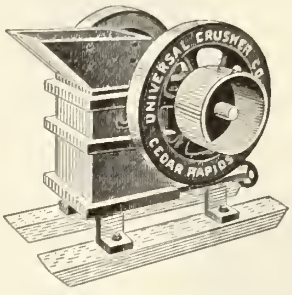

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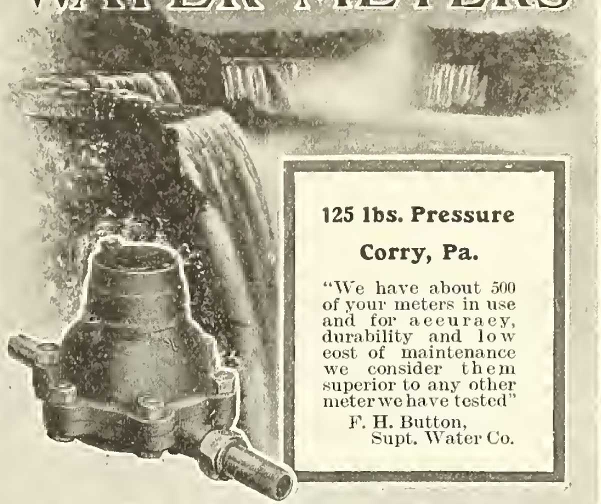

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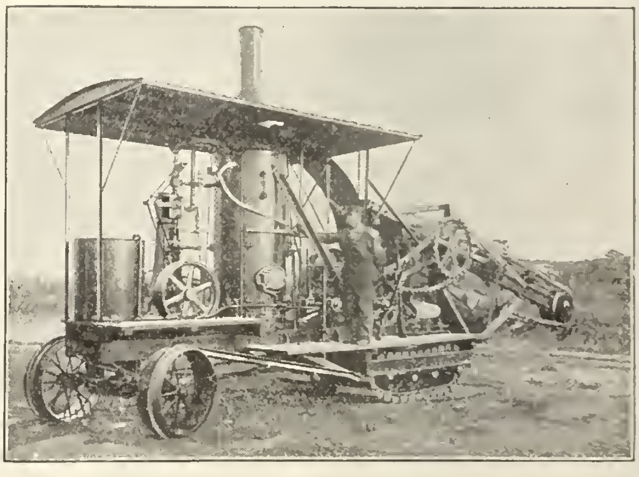

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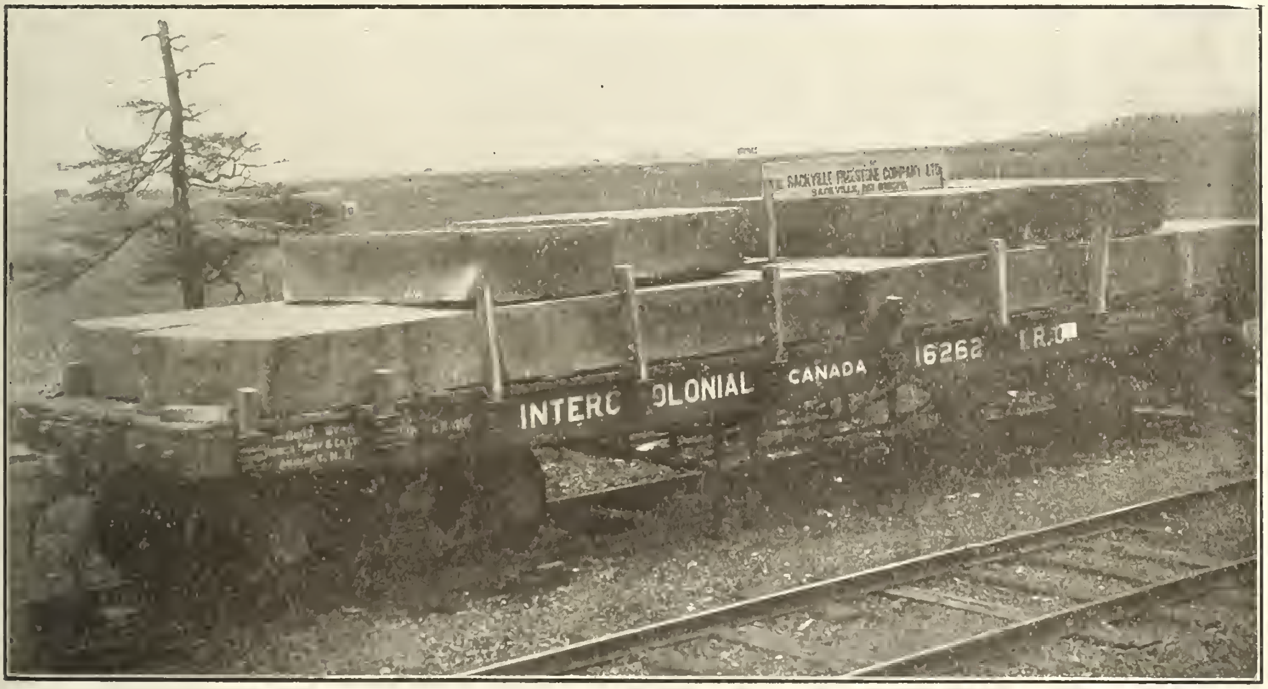

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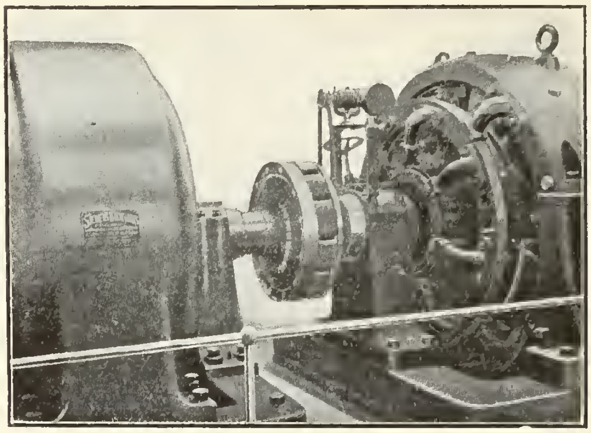

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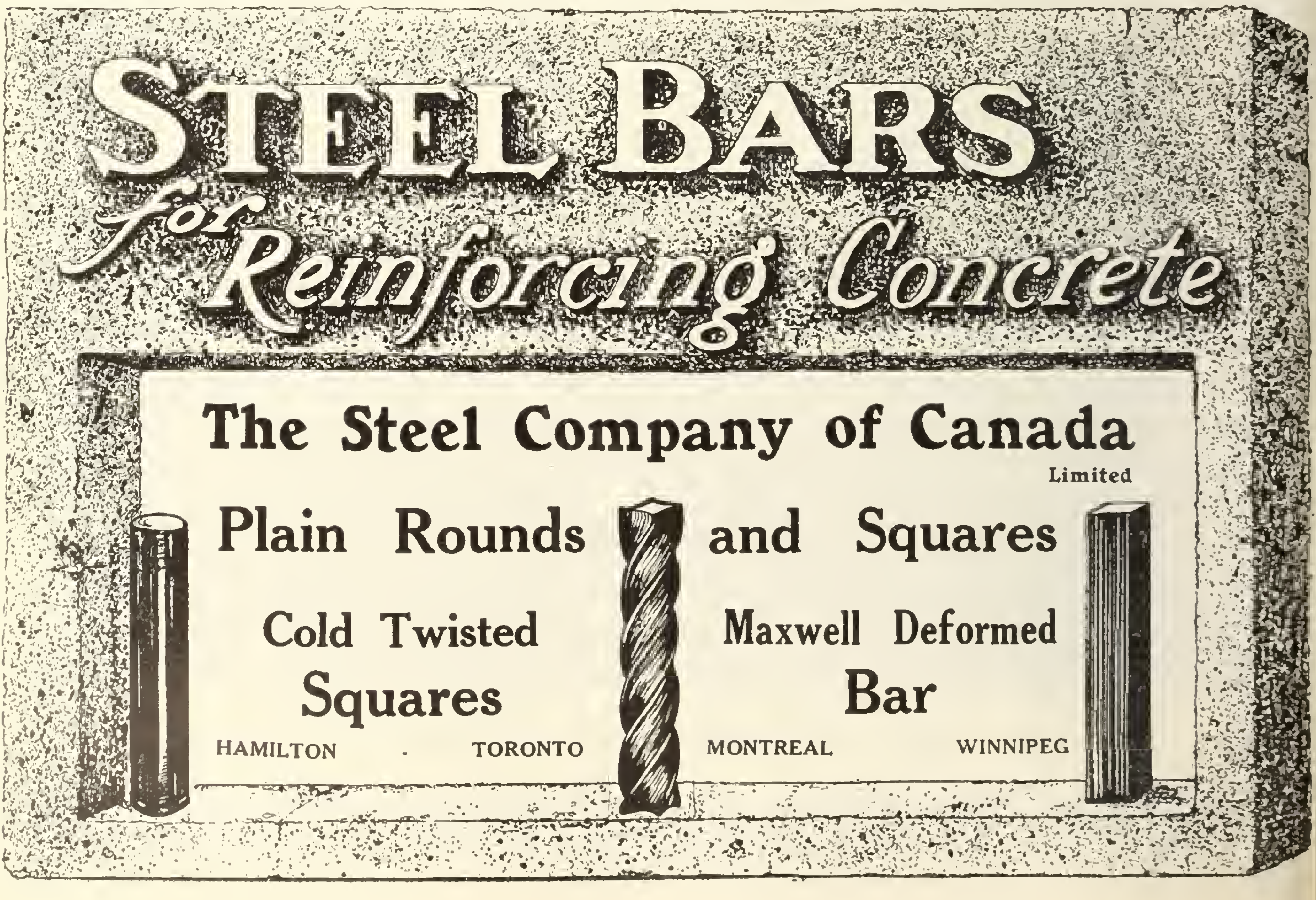

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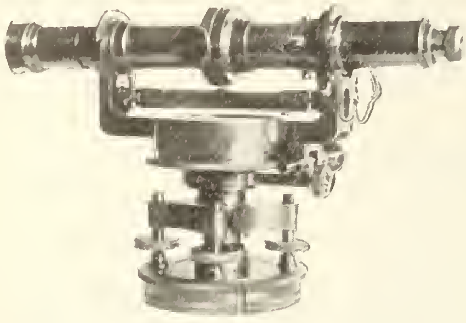

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FEATURES

New "Y" Adjustment:

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SPECIFICATION

Powerful achromatic telescope, having screw focussing eyepiece and object glass giving large field, cross hair diaphragm, sunshade and dust cap, rack and pinion movement. "Y's" fitted with new adjustment—simpler, more direct and easier to effect than on any other make of instrument. Graduated level bubble. Compass divided to degrees, with edge bar needle, vernier reading to five minutes. Clamp and slow motion screw. Caps to protect screw joints on telescope. Four-screw levelling adjustment, with centreing motion. Base provided with screw sockets to take trivet points—no separate Wall Tripod being required. Complete with full kit of accessories, in polished mahogany case, and split leg new pattern tripod.

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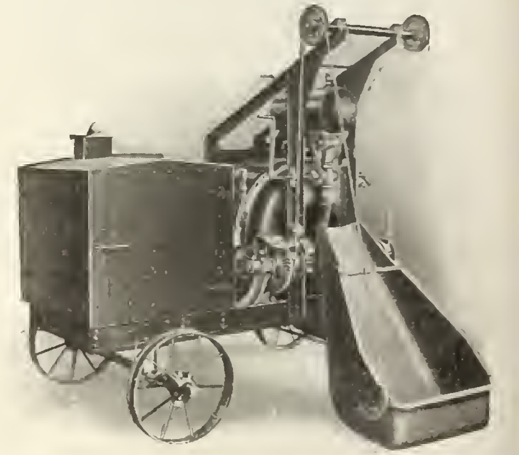
The heavy cast special metal Koehring drum will outlast the drum of any other Mixer. The railroad truck bearing truss and the rollers being keyed on to the axle, makes "wabbly" drums in possible.

The charging bucket raises to a nearly vertical position so that all the material will pass into the drum without pounding the bucket. There are numerous other important features in the Koehring Mixer that you should know about.



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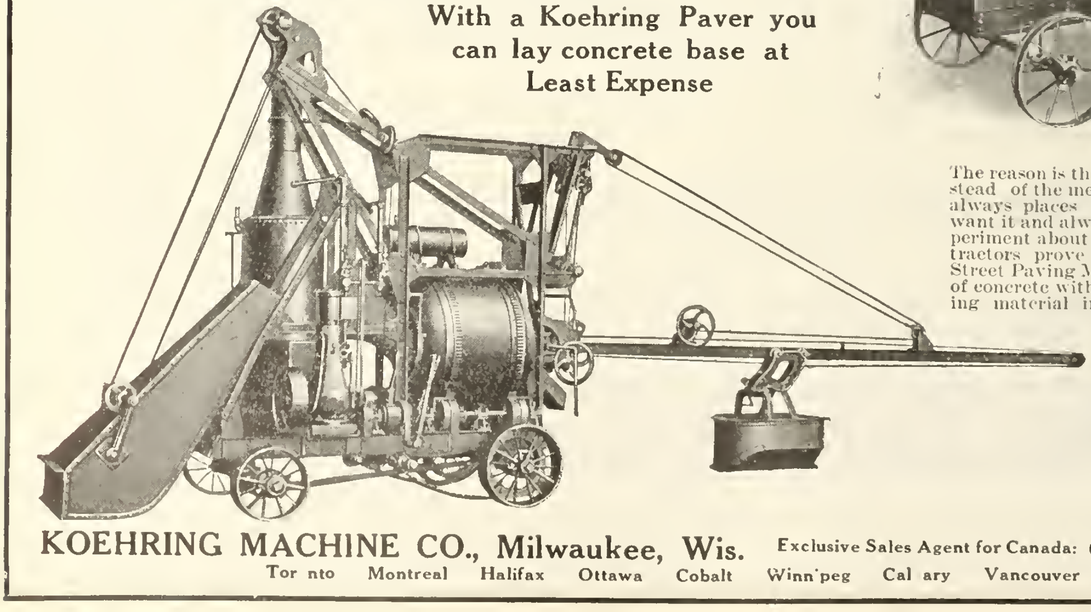

The reason is the machine conveys the concrete instead of the men, and it's a dependable conveyor, always places the concrete exactly where you want it and always dumps clean. There is no experiment about it, the records of dozens of contractors prove the economy of the Koehring Street Paving Mixer and it combines this placing of concrete with a simple charging bucket for getting material into the drum in shortest possible time and least number of men, also, it has traction drive for moving the machine along the line of work and keeping close to the material pile. This builds contractors reputations and pays handsome profits. Aren't you interested in this reputation and profit making?

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Rot-Proof Air Hose for Use and Abuse

You save money when you buy Goodyear Air Hose for the reason that it lasts longer—gives more service than any other air hose manufactured. This is because we make it by a special process that renders it impervious to the attack of compressor oil—the ruinous agency that rots all other air tubes.

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The Economical Hose for All Pneumatic Uses

The great difficulty with all rubber air hose is that due to the action of the oil that comes from the compressor. This oil rots the inside of the tube. Then it chips off, clogs up the throttle and before you know it your tube is useless and your tools need repairs.

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Can be supplied with the further protection of wire winding or Marlin wind. Made in three grades. Used in practically all mining operations, steel construction works and boiler works—wherever pneumatic tools are in use.

In all of our business in Canada last year, we had to replace because of slight defects, only $155.22 worth of goods.

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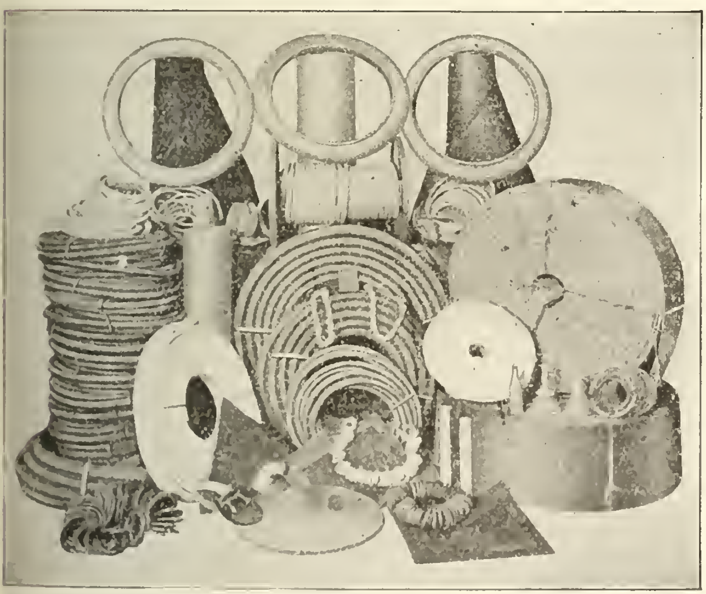

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(11)

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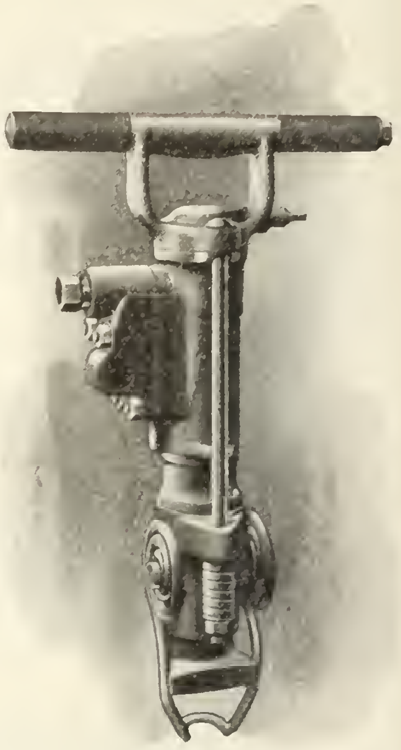

'BCR-43' Hammer Drill with Automatic Rotation of Steel. For use with steam or air.

'BA-23' Hammer Drill. For use with steam or air. Weight 43 pounds.

The adoption of the "Butterfly" Valve has proved the most successful event in the history of the hammer drill. Rand tools embody the best principles of the earlier rock drills combined with the advantages of the hammer type. The illustrations show those new tools to have separate front heads, buffer springs on the side bolts and other rock drill principles. Every part is as simple and plain as is possible to make it. Using materials suitable for each part and simplifying design has reduced the cost of upkeep to practically nothing.

The enormous drilling capacity of these tools is far greater than anything ever offered to the trade. Every ounce of power consumed is devoted to actual drilling, as the Butterfly Valve operates on a pivot and is absolutely frictionless. It advances to its seat instead of sliding thereon. The longer it runs the better it fits.

Experience gained from forty-one years drill building governs the design of "Rand" drills.

We have branches and warehouses within twenty-four hours' distance from any Canadian point, assuring quick service. Our sales force has authentic information for the use of our customers. Let us work out your drill problem together.

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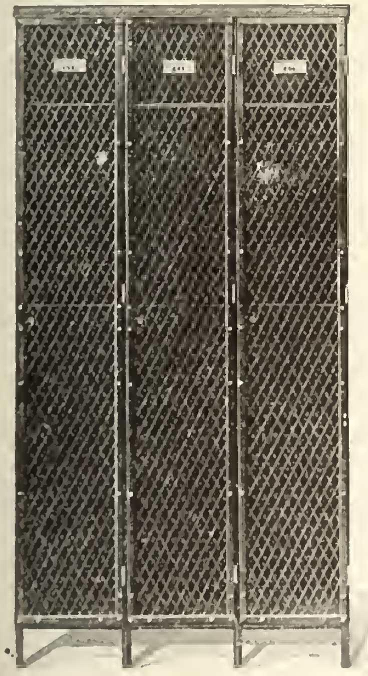

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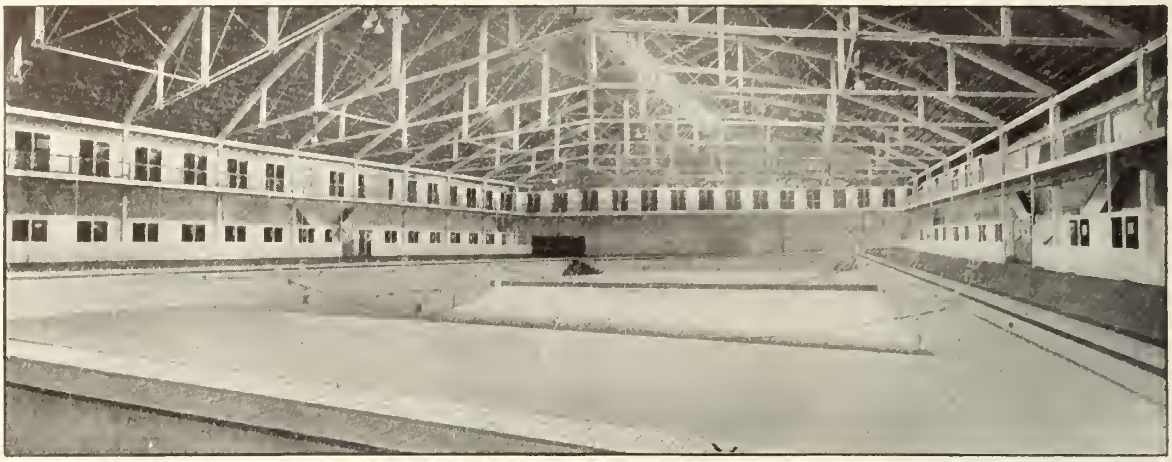

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Glencoe Lime & Cement Co., St. Louis.
St. Louis, Mo., Nov. 8, 1908.

Gentlemen: In all of my experience with large swimming tanks in this country and Europe, I have not seen one that did not leak somewhere and I hesitated before writing this, waiting to see if our tank, after it had been emptied for some time, might not disclose a defect somewhere. I now unhesitatingly state that your Medusa Waterproofing used in the construction of our tank walls and bottom, is indeed a remarkable compound, the more when it is considered that our tank is the largest swimming pool anywhere—containing nearly one million gallons of water—and that, with tremendous pressure asserting itself, not a single leak has been found so far. As I stated before, it is remarkable, for, when building tank, I anticipated from my past experience, a great deal of trouble from leaks. Of course, I am doubly pleased with the results. (Signed)

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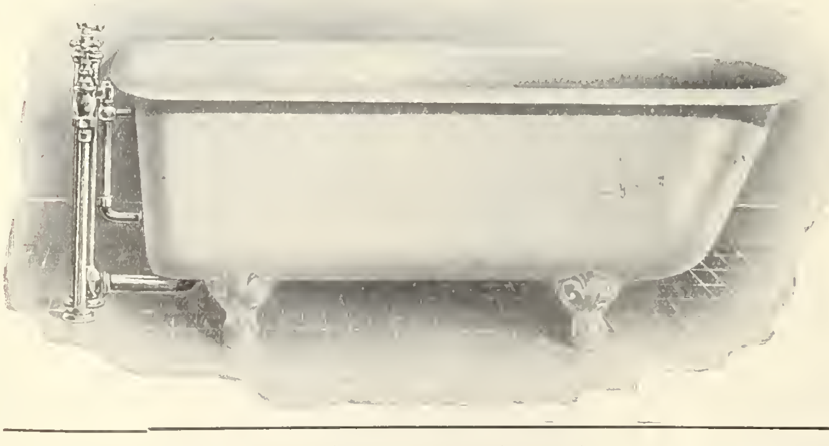

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Contract Record
and Engineering Review

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Alphabetical Index of Advertisers Page 16

Vol. 26 March 13, 1912 No. 11

Specifications for a Good Engineer

"A good engineer must be of inflexible integrity, sober, truthful, accurate, resolute, discreet, of cool and sound judgment, must have command of his temper, must have courage to resist and repel attempts at intimidation, a firmness that is proof against solicitation, flattery or improper bias of any kind, must take an interest in his work, must be energetic, quick to decide, prompt to act, must be fair and impartial as a judge on the bench, must have experience in his work and dealing with men, which implies some maturity of years, must have business habits and knowledge of accounts. Men who combine these qualities are not to be picked up every day. Still, they can be found. But they are greatly in demand and when found they are worth their price; rather, they are beyond price and their value cannot be estimated by dollars."—Chief Engineer Sterling's Report to the Mississippi Levee Commissioners.

Contractors' Understudies and Their Functions

NUMEROUS contractors with businesses of considerable magnitude are apt to attend to almost all the details of their various projects themselves, without taking anyone in their employment into their confidence to any notable extent. They know just how they have estimated on the work in progress or work for which tenders have been submitted, and they know just how they intend to carry on the work to make a profit. But is there anyone else in their employ who can take their place should they be compelled to be absent for a week or a month—as is so often the case in a land of long distances like Canada? Has the foreman exact knowledge of where to buy the different materials and supplies and on what terms? Does he know anything about the cost of doing the work and what amount should be charged for establishment expenses? Even though he might be able to finish up the work in hand, would he be able to estimate on new work? In short, would the business of the contractor come to a standstill because he were not able to give his undivided attention to the work?

The greatest mistake that any business-man makes is not to have an understudy—a second official who is able and ready to take up his work in case he should be called away. Some contractors seem so afraid that their foreman will know something about their business that they will scarcely let him know what they have figured on a piece of work, much less ask his assistance in estimating. They fear that if he learns too much he will start in business for himself, and that next they would hear from him might be that his tender proved lower than theirs. A man is perfectly justified in wanting to better his conditions, and the foreman who has no ambition to some day take a contract for himself is not of much value as a foreman. Little hesitancy should be shown in taking advantage of any inclination on his part to assist in preparing estimates. In doing this the contractor is preparing his foreman to start for himself some time, and is doing it in such a way that will make him an intelligent competitor, who is far less likely to enter into cut-throat competition than a man who knows little or nothing of estimating or the cost of doing work. For instance, if he has learned to make sufficient allowance for general running expenses in making up an estimate, he will not be likely to approach this important matter vaguely when he starts in business for himself; and as an intelligent, conservative competitor he will do well-established concerns less harm than if he were ignorant of the real cost of construction work, and if his sole aim were to bid low enough to be awarded the contract and then be tempted to skimp the work in order to save himself from serious loss.

Meanwhile, training foremen and office staff so that each may bear a more intelligent part of the business and that each of them may have some real responsibility, will form a business into such a shape that should the absence of the heads of the firm be unavoidable, even though it be for months, the work will go on very much the same as though they were there for personal supervision; or at least it will be sufficiently well managed that a short absence would not prove disastrous.

Contract Reform

IN a recent communication to this journal, His Majesty's Trade Commissioner, Mr. Richard Grigg, refers to comments on the question of contract reform made from time to time in the Contract Record and Engineering Review. Concerning the matter of inadequate time allowance—a failing of the authorities in this country that has done so much in the past to hamper the development of Imperial trade—and also the principle of calling for outside tenders in bad faith, i.e., when there is a predisposition to let the work locally, Mr. Grigg says:

"The difficulty in regard to the short time allowed for tendering does not so much apply, although it has applied to a certain extent, to tenders for the Government Departments as for Municipalities, and continuous effort appears necessary to impress upon these the bad policy of asking for tenders which are not meant to be accepted and of making provisions in regard to time which render it impossible for British firms to submit an effective bid. You will doubtless realize the unfortunate effect of such procedure in the British money market where the credit of Canada and everything Canadian deservedly stands very high. So far from seeking to diminish that fortunate position Canadian interests appear to demand that every effort should be made to maintain it and avoid any whisper of bad faith."

Why Abolish Piece Work ?

CAN anyone give a good reason for the expressed desire of many workmen to abolish piece-work? The concerted and continued attempt to obtain this end is detrimental both to employer and employed. Men do not always see, or, if they see, carefully consider all the sides of a question, hence often come to a totally wrong conclusion. We are of the opinion that a fundamental error holds generally as regards amount of work per man per hour or per day. It is a fatal mistake to imagine that decreasing the output per individual will lead to an increase in the number of individuals employed. The exact opposite is the case—it leads to more unemployment. After all, the man who does work is a machine. What is the use of blinking the fact, or thinking it derogatory to be likened to a machine, when all the time it is so? We try to obtain efficiency in a machine—which means simply we try to get as much work out of the machine as is put into it. Of course, perfection can neither be obtained nor approached. Is the man more efficient when employed on day work, or on piece work? That question has never been answered by those who persistently oppose piecework, nor can it be answered by a perfunctory statement, but it is well known that the output when working by the day is very different to the output when working by the piece. In the latter case, does the machine depreciate more—so that the total of the life output will point to loss of efficiency; if not, retain piece work by all means.

Engineering Education

PROBLEMS of engineering education are rapidly increasing in difficulty, but the difficulties are perhaps not so apparent to the individual teacher presenting a single subject, as to the faculty who must co-ordinate many subjects, or to the student who must within the period of curriculum prepare himself for his special field of engineering work. Every one of these fields (civil, mechanical, electrical, mining, industrial) is rapidly expanding, says The Engineering Magazine. New subjects are coming up; new specializations are evolving. To be prepared for whichever specialization may demand his life work, a student must make some preparation for all. The total weight of the resultant work threatens to exceed the elastic limit of the time set for the course. The six-year course, supplanting the former four-year course, is already announced; and many able and earnest thinkers on the subject, looking back to the days when men began younger, and worked out their learning in parallel with their experience, fear serious disadvantages from the long residence in academic bounds and the late entry into the field.

Perhaps one difficulty comes from the conscientious thoroughness of the specialist teacher. He seeks the impossible purpose of turning out specialists. Perhaps another difficulty is the attempt to show too much practice. Practice can not be efficiently reproduced in academic institutions whose function is rather to explain and inculcate principles—scientific data upon which practice is founded. Perhaps the greatest difficulty of all goes back to the preparatory schools. The university tries to build too intricate a structure upon too small a foundation, not always well laid, and finding this insufficient, attempts to extend the foundation while construction is going on. The solution seems to lie in the direction of a much larger, more broadly conceived, but more elementary framed structure built upon it by the college course, leaving much of the arrangement and elaboration of the spaces between that framing to be completed after the student's more permanent intellectual leases have been let.

What we need most and increasingly is not more handicraftsmen, nor men skilled in more handicrafts, but more engineers of broad vision and wide general culture, capable of organizing and administering the work of the narrowly skilled, even if specially skilled, professional practitioner.

Builders' Officials in the Middle Ages

THE following list probably includes all officials commonly employed by Mediaeval builders: Clerks of works, masters of works, setters out of work, overseers, surveyors, deputy-surveyors, paymasters, purveyors, and builders' clerks. To some extent, as we shall see, the work of any one of the above-named officials was at times carried out by any other of them. In more than one instance we shall see that one man executed the functions of no less than three officials.

The Clerk of Works

In modern times this official is known as the Clerk of Works, but in Mediaeval days he was spoken of as the Clerk of the Works (in the Record Office MS. 464-20 "Clarcke of the Worckes"). It is probable that many Mediaeval accounts recording the expenditure in wages and the cost of materials purchased were set down by the builders' clerk acting directly under the authority of the clerk of works. We may suppose the actual accounts as they remain to-day to have been made up from entries set down at the time. Indeed, we sometimes see in these accounts a statement that the expenditures recorded may be seen in greater detail in other books. Of Mediaeval building accounts remaining, set down under the authority of the Clerk of Works, perhaps one of the most interesting is that in the Record Office labelled Exch. Acc. 504-2. In this MS. we see that the "clerk and surveyour of the sayde workes" was paid at this rate of 4s. a day to cover his "ordynary rydynge costes from place to place to know his grace's pleasure not only for surveying of the foresaide castells and monnours for buyldynges and repayrynge of the same, but also for rydyng dyvers tymes for makying of payments for the foresaide buyldyinges and reperacions done," For his "ordynary boote (boat) hiren" he had 20d. a day, and "for his ordynarye ffee belongynge to the foresaide offyce as Clerke and Surveyor of the sayde workes at iis. the day, over and besydes vid. the daye more to hym allowyd for a Clerke to make the bookes." In MS. 464-20 we see that Laurence Norton was Clarcke of the Worckes in 1546. He was paid 8d. a day for "makyng of purvycion of naylles, tylle, tyllepyns, lime," etc.; for procuring workmen, for overseeing the workmen, and for making up the books. Norton was paid his last wage on October 3, 1546, the new clerk commencing his duties as "clarcke of the worcks" on Monday, the 5th, and receiving his first wage on Saturday, the 10th. In MS. 549-22, a clerk of works is paid but 6d. a day, the page in which such payment is entered recording also the payment to labourers of 5d. a day. The following order to a Clerk of Works in the year 1517 is to be seen in the Record Office MS. 474-9. Such orders, so common at one time, are now rarely met with.

> "We wol and commaunde you, that ye with diligence vpon the sight hereof, ye deliuer or cause to be deliuered vnto our trusty seruaunt syr John Nevell, Knight, towardes the buylding of a house at Mile ende, oon hundred thousande of breke and twenty quarters of lyme, being of oure owne store and provision and to be deliuered at the said Myle ende at oure owne propre costes and charges. And this our lettres shal be your sufficient warrant and discharge in that behalf. Youen vnder our signet at our manour of Grenewiche, the xiith daye of Julye, The ixth yer of our Reigne.
>
> "To our trusty and wel beloued seruant,
> "Henry Smyth, Clerk of our workes."

Masters of Works and Overseers

Masters of Works are rarely mentioned, but in the time of Henry VIII. a carpenter of the name of John Kerver eventually rose to be a "Master of the Kings Workes" in the district of North Wales. In one of the many records of building operations carried out under the authority of John Kerver, we find the entry of a payment to himself "for overseyng and settyng a work the seide workemen" (MS. 488-30). Here we find the same man both Master of the Works and Overseer. In an account of certain building operations mention is made of wages paid to "ouerseers" (MS. 488-15). In MS. 504-2 a Lauraunce Bradshawe receives 16d. a day, he is called "The Setter forth of Workes and Ouerseer of Workmen." In another place he is described as "The Setter oute of Workes." Subsequently Bradshawe's wages were reduced to 12d. a day, excepting on those days when he was out "ridinge," on which occasions he was paid 20d. per day. In MS. 464-20 Thomas Jauncy is paid 6d. a day for "overseeing" that the workmen "do they're dute," and for making up the books. In this case we see the same man doing the work of an overseer, and also that of a builder's clerk. It is also to be noted that the side heading to this entry is "clarcke of the Worckes." He executed the functions of three officials.

The Purveyor

The purveyor was the official whose business it was to travel about to secure the various materials needed by the builder. In MS. 504-2 the duties of the Purveyor are set down very clearly:—"Purveyour. Provydinge as well carriage for tymber, borde, lathe, quarters, and other necessariis hade out of Suffolk as also for carryage here nere home of tymber and plankes bought." In MS. 479-11 we read of expenses entailed by "the purveyours rydyng abought sondry provysions for the said workes." The purveyor was not a highly-paid official; he was probably paid about 8d. a day in addition to his expenses for horse hire. Sometimes he is placed in the same group as the clerks: the following entry, however, draws a distinction between the purveyor and the clerks: "ii purveyors, ii clerkes, and sondry labourers dayly retaynid." In MS. 504-2 John Downe is "purveiour" at 6d. a day.

The Surveyor, Deputy-Surveyor, and Paymaster

In MS. 488-27 we read of the "deputy surveyor," an official very rarely mentioned in builders' accounts. In MS. 489-17 we see that Robert Buryhill was surveyor, paymaster, and purveyor; he rode "from place to place for provisyons." Official paymasters are rarely mentioned, the payment of the workmen probably generally resting with the clerk of works. In MS. 545-29, Jefery Gates is "paymaster to the workemen." Accounts are set down under his authority in MS. 544-12. Laurance Bradshawe was a paymaster, an overseer, and one who "set" the men at work. The sum of 5s. 4d. is entered in MS. 504-2 as having been paid him "for Rydinge from Westm' (inster?) to Dunstable to paye worke men there by the space of iiii dayes." Robert Pilling rode with him "for the savegarde of the same monye," receiving 4s. for so doing. In MS. 474-3 John Baylle is purveyor and overseer, too, at 5d. a day. In MS. 465-20 Hector Hassheley is paymaster and surveyor at 12d. a day. In MS. 489-16 the surveyor sees to the workmen and acts as purveyor, receiving a stipend of £10 a year, for which sum he was expected to provide the horse, which was practically part of the equipment of a purveyor. An instance of a surveyor called on to furnish a report and estimate for the repair of a building is to be seen in MS. 458-9.

The Builder's Clerk

The ordinary builder's clerk was paid 6d. to 8d. a day. (MS. 477-12.) In MS. 504-2 we read:—"The Clerk. The Clerke keeper of the checke boke and ouerseer of the workmen." Here a clerk acts as overseer. The check book was possibly a volume in which the materials were entered as they were delivered on the site.—Building News.

The imports of building stone into Canada during the fiscal year ended March 31, 1911, were: flagstone, granite, rough, sandstone, and all building stone, not hammered, sawn, or chiselled, 28,001 tons, value, $126,586; flagstone, allother building stone, sawn or dressed, 36,537 tons, value, $206,082; total, 64,538 tons, valued at $332,468.

"Will you allow me to ask you a question?" interrupted a man in the audience.

"Certainly, sir," said the lecturer.

"You have given us a lot of figures about immigration, increase of wealth, the growth of trusts, and all that," said the man. "Let's see what you know about figures yourself. How do you find the greatest common divisor?"

Slowly and deliberately the orator took a glass of water.

Then he pointed his finger straight at the questioner. Lightning flashed from his eyes and he replied, in a voice that made the gas jets quiver:

"Advertise for it, you ignoramus!"

The audience cheered and yelled and stamped, and the wretched man who had asked the question crawled out of the hall a total wreck.

Exterior view of Montreal Water & Power Company's filtration plant.

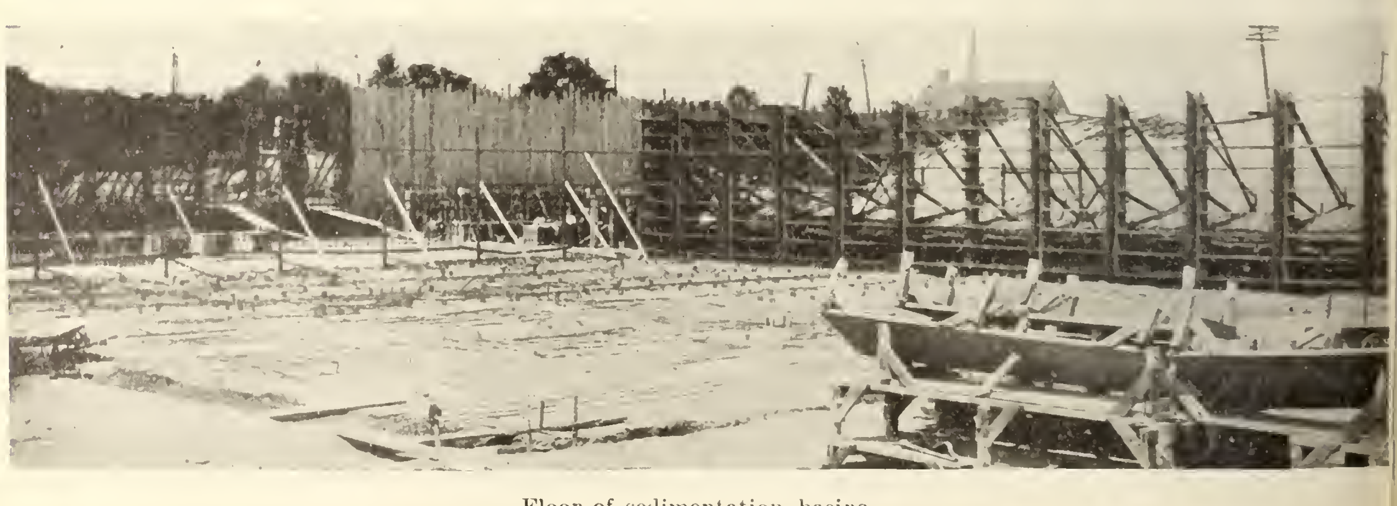
Rapid Mechanical Filtration at Montreal

The Design, Construction and Operation of The Montreal Water & Power Company's Plant now nearing Completion

BOTH the City of Montreal and the Montreal Water and Power Company have under construction filtration plants for treating the water of the St. Lawrence. These plants will supply the city's wants for many years. The plant of the Montreal Water and Power Company, which is expected to start on the preliminary runs within six weeks, is of the rapid mechanical type, equipped with sterilizing apparatus for final treatment. It is designed to treat thirty million U. S. gallons daily, but the present installation of fifteen filter units can be extended to have a capacity of fifty million gallons daily.

The works, located along the St. Lawrence, comprise coagulating and settling basins, fifteen mechanical filtration units, an air and wash-water storage tank of special design, a clear water reservoir, hypochlorite apparatus and electrically operated pumps, blowers, etc. The tank for storing wash-water and air under pressure for use in agitating and cleansing the filtering media is built in two sections, the upper one telescoping into the lower one after the manner of a gas-holder. This tank, it is believed, will be responsible for a very marked economy in the first cost and operation of the plant as it makes possible a substantial reduction in the necessary capacity and size of the wash-water pumps and blowers, but the greatest economy will be effected by allowing continuous operation of small wash-water pumps and blowers by electric power furnished on a flat rate based on maximum consumption.

The raw water to be treated consists of a mixture of St. Lawrence and Ottawa River water, which is subject to rather marked seasonal changes in character. Normally the water is quite clear and free from turbidity or color; it is rather hard, the alkalinity averaging about 95 parts per million. It is low in permanent hardness for incrustants, these averaging 20 parts per million. The water is turbid and charged with sediment and color to some extent during a few weeks in the spring and autumn; its bacterial content is never high, however, but generally abnormally low for water of a river of this character. Owing to an ever-increasing demand for filtered, colorless water, the company decided to install the present filter plant. The water furnished has been sterilized for more than two years and is satisfactory from a bacteriological point of view to the Provincial Board of Health. The river water will flow by gravity into existing suction wells and will be raised by low-lift centrifugal pumps to a point from which it will pass by gravity to the various tanks and filters into the



Floor of sedimentation basins.

Forms for walls of sedimentation basins and filter gallery.

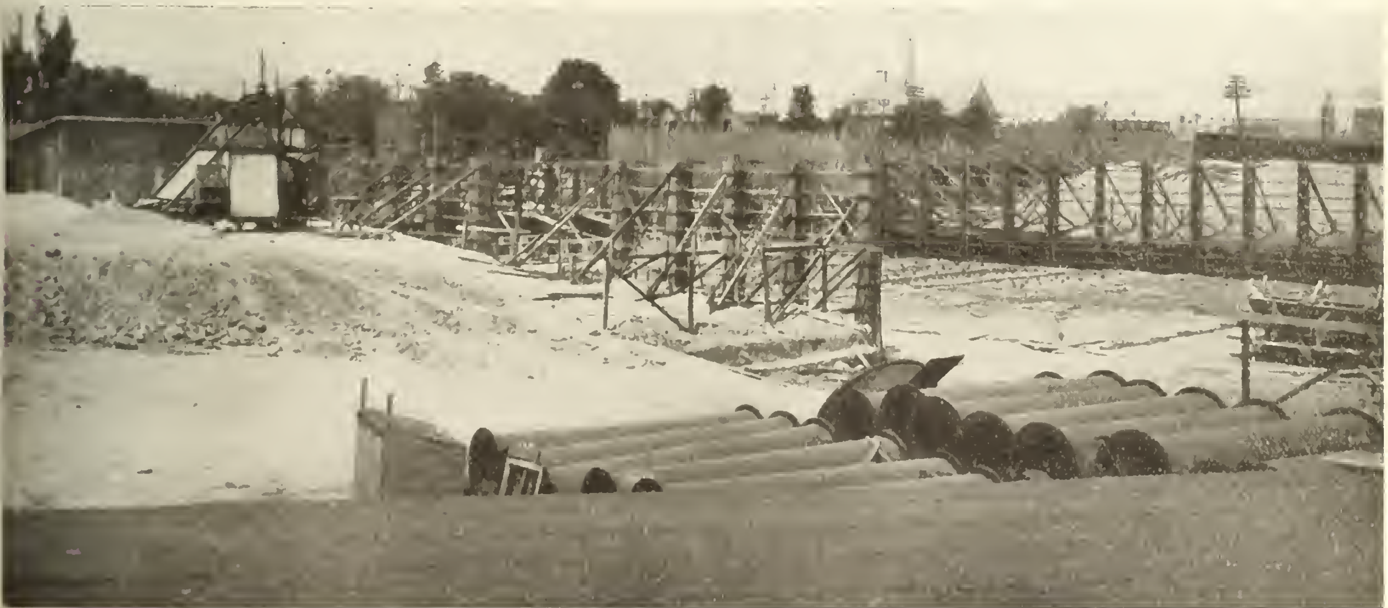
clear-water reservoir from which it will be pumped into the company's distribution system.

The raw-water pumps are driven by electric motors operating on current generated by an outside company and will comprise three units of 21,600,000, 14,400,000 and 7,200,000 gal. per day capacity respectively. Each of these raw-water pumps will operate against a total head including friction of 29 feet and will discharge into a 60-inch steel main connecting with a concrete flume leading to the sedimentation and coagulation basins. At the inlet end of the basin is an influent chamber where the flow of water will be regulated automatically by a shutter valve according to the level of water in the basin. The shutter valve is opened and closed by means of a large float and its object is to maintain a uniform rate of flow through the basins.

The settling basins are in duplicate, each holding about 560,000 gallons of water. They each measure 110 feet by 48 feet 6 in. in plan and are divided into two halves by longitudinal baffle-walls of concrete which cause the coagulated water to pass the length of each basin twice before reaching the skimming wier at the outlet end. The basins are covered by the concrete roof of the beam and slab type to prevent the water freezing during the cold winter months at Montreal.

Coagulated and settled water is conveyed into the filter house by a concrete flume with connections with each of the 15 units. The top of this flume forms the floor of the operating gallery and below it is the pipe gallery. Each filter unit has an area of 696 square feet, and is divided into two halves by a central wash-water gutter of concrete to which are connected eight lateral wash-water gutters of cast-iron, four on either side. The filtering material consists of 9 in. of gravel graded in size from ⅛ to ¾ in. upon which rests 27 inches of sand having an effective size between 0.4 mm. and 0.65 mm., and a uniformity coefficient ranging from 1.5 to 1.8. The rate of filtration for which the plant was designed is 125,000,000 gallons per acre per day.

The Strainer System is the New York Continental Jewell Company's standard type, consisting of an elliptical cast-iron header with a section equal in area to an 8-inch pipe and manifolds of 1¾-in. lateral pipe spaced on about 6-inch centres. The laterals are drilled and tapped on their top sides at intervals of 6 inches to receive the strainers. The elliptical header pipes also are drilled and tapped for a double row of strainers. The strainers are placed so as to provide at least four for each square foot of filtering area; the entrances are through ⅜-inch diameter tubes, extending into the lateral pipe to form a water



Floor and pilasters of sedimentation basins.

Forms for filter gallery, showing pillars supporting roof of sedimentation basins.

seal and effect a satisfactory distribution of air while washing. Each strainer cap contains thirty-three 1/16-inch holes. The system when assembled in place is imbedded in concrete so as to leave only the upper portions of the headers and strainer caps exposed.

The wash-water main is 30 inches in diameter with 16-inch branch connections to each filter. The water is supplied under pressure from the storage tank, passes up through the bottom of each header of the strainer system out through the laterals and up into the filtering material. The main air line is 12 in. in diameter with 8-inch connections to each filter. The piping is carried above the wash-water gutters and is connected at two points in each header by a 4-inch vertical pipe. It is expected that each filter unit will require two washings daily. The estimated amount of water for each wash is 18,000 gallons or a total of 540,000 gallons daily for the entire plant. This amounts to about 2 per cent. of the quantity of water filtered each day.

The filter effluent passes directly into the clear water basin through 14 inch down-drafts. The rate of filtration is regulated by an effluent controller of the Venturi type, one for each filter unit. The valves for controlling the effluent, wash-water, air and filtered waste water connections are to be hydraulically operated. The pistons of the valve will receive water under pressure from the company's distribution system.

The amount of water required to back-flush the filtering material one unit during one washing is estimated at about 18,000 gallons, while the air required for agitating will be about 9,500 cubic feet. As the operation generally requires about 3 min. the water must be supplied at the rate of 6,000 gal. per

Forms for floors of filter beds.

minute, assuming that only one filter is washed at a time. Similarly air must be supplied at the rate of 3,000 cubic feet per minute for a period of about 2½ minutes. If no means of storage were provided these requirements would call for a 6,000 gal. per minute pump operated by a 125 h.p. motor for wash-water and a rotary blower driven by a 60 h.p. motor. This installation would probably be made in duplicate, but by adopting the storage tank for air and water the capacity of the duplicate wash-water pumps of 750 gal. per minute each is so reduced that 15½ h.p. motors are sufficient to drive them as against 125 h.p. motors under the other assumption. With means of air storage 5 h.p. motors are big enough to drive duplicate blowers of 175 cubic feet per minute capacity, instead of 60 h.p. motors, which would be necessary otherwise.

In a plant such as the one in question where provision is made for the simultaneous washing of two filter units, which would demand intermittent service of large wash water pumps, the storage tank scheme is believed to be particularly adapted. The present wash water pumps and blowers require only about 5 per cent. of the power for running the raw water feed pumps and the rest of the plant equipment. If wash water and air were supplied direct to the filters instead of through the storage tanks, the percentage of the total load would increase from 5 to about 30, but as stated previously, the Montreal Water and Power Company purchases its electric power from an outside company on a flat rate basis for maximum load recorded; hence the desirability of the above arrangements will be seen.

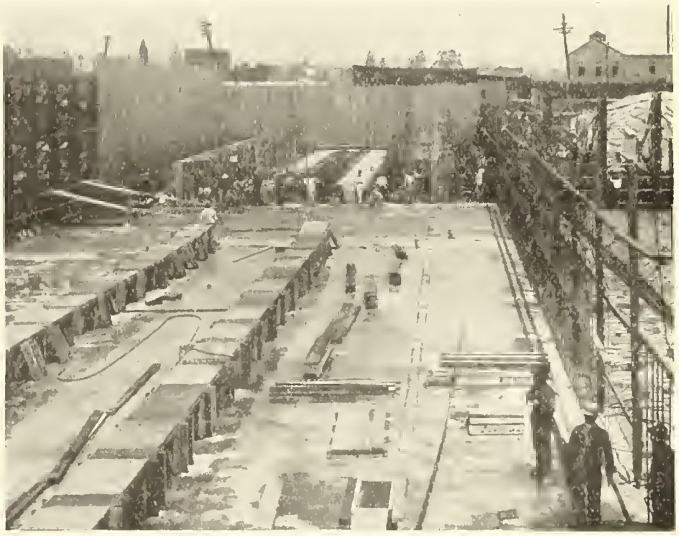
The telescopic tank is capable of holding about 90,000 gallons of water and about 17,000 cubic feet of air under a pressure of approximately 3 lb. per sq. in. It is made of steel plates. The telescopic holder which forms the upper part of the tank makes it possible to combine the storage of air and water in one structure. The water level in the tank under normal conditions will be approximately 18 feet above the level of the wash-water gutters in the filters and the pressure of the air will be maintained constant at 3 lb. by the dead weight of a concrete slab, 3 feet thick which forms the head of the air holder. The capacity of the washwater section of the tank is sufficient for three filter washes of 5 min. duration each, or in the event of the two wash-water pumps being in operation for five consecutive filter washes at periods from 10 min. from the starting of one to the starting of the next, and after a period of 10 min. from the completion of the fifth filter wash, sufficient water will be available for a sixth wash. The 17,000 cubic feet of space for compressed air is enough for three filter washes of 2½ min. duration each. The conditions of washing additional filter units when both blowers are in operation are the same as those described for water washing. The steel plates forming the outer tank vary in thickness from ½ inch at the bottom ring to ¼ inch at the top. The inner tank is of ¼ in. plate and the head of ⅜ in. plate.

The water is fed to the tank through an opening in the bottom and the air through a riser. When the air holder descends, this air riser would strike the concrete head if no opening were provided for it. For this reason the cylindrical manhole tube, 3 feet in diameter, capped with a cast-iron cover is provided. It forms a sort of chimney in the top of the tank through which the air riser extends when the air is removed.

The telescopic tank is provided with turned cast-iron rollers fitted with brass axles, which ride freely on a system of I-beam guides well braced. There is provided within the tank a system of cast-iron pipe columns braced to one another and bolted to the tank bottom; the function of these columns is to support the head of the air holder when the air is discharged and to prevent injury to the tank bottom.

During the operation of washing the filters there will be certain variations in the level of the water in the wash-water tank so that to secure a uniform rate of back-flushing a pressure regulating tank is interposed between the main tank and the filters. This tank, 6 feet in diameter and 35 feet 6 inches high, is connected to the telescopic tank by a 30-inch pipe and the flow into it is regulated automatically by a float actuated shutter valve.

The mixing of the chemicals for coagulating and disinfecting the water will be done in a room on the second storey of the filter building so that the solutions may be fed to their respective points of application by gravity. All of the tanks are in duplicate. The alum dissolving tanks are long rectangular basins with manifolds of perforated spray pipe at their bottoms. The hypochlorite mixing tanks are circular in plan. The mixing will be done mechanically by revolving rakes driven by belting from an overhead shaft which extends the entire length of the room. The hypochlorite mixing tanks are to be charged by means of cylindrical bottom-dump buckets which just fit over an opening in the top of the tank. The chemical solution will be applied from constant level orifice tanks. The orifices are of hard rubber. The plant was designed and is being built for the Montreal Water and Power Company under the direction and supervision of Mr. F. H. Pitcher, general manager and chief engineer, and Mr. W. H. Sutherland, assistant engineer of the company. The contractors for the work are Messrs. Laurin & Leitch, Montreal, with the New York Continental Jewell Filtration Company as sub-contractors for equipment, detailed plans, etc.



Floor of clear water basin.

Mr. Jas. O. Meadows, Sanitary Engineer, formerly of the United States Isthmean Canal Commission, in charge of the sanitary control of the water supplies of the Canal Zone, and later Sanitary Engineer of the Province of Quebec Board of Health, has been appointed by the Montreal Water & Power Company as expert in charge of the operation of the plant.

Contractors' Cost Keeping on Sewer Work

Methods Adopted by Toronto Firm—Practical Value of Records of Materials, Nature of Soil, Efficiency of Workmen—Itemized Costs

Specially Contributed by F. W. Thorold, Toronto

During the summer of 1911, the firm of Fry & Thorold, contractors, attempted to keep a system of costs of the various items in the construction of about 17 sewers and it is the intention of this article to explain the method adopted and suggest several improvements.

The "Daily Progress" sheet reproduced herewith was designed to assist in this work. It is printed on letter-size paper which makes it convenient for filing and leaves plenty of room for all the information required, without any crowding. The sheet was filled up by the time-keeper, a young man of about 22, as neither of the contractors was constantly on the work.

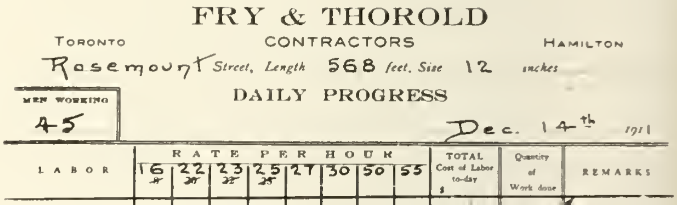
The time of the men working on excavating and backfilling was obtained from the foreman, while that for shoring was obtained from the men themselves. It was found to be impracticable to fill in the figures for pipelaying as the pipelayer always had to do a certain amount of excavating. To have separated his time and that of his assistants would have been only a guess in any case and it was thought that the contractors could make this guess themselves. At the time the space was left for "other labor" it was not thought that there would ever be much in this space but as it was found advisable not to try and separate the pipelaying, all labor in connection with this was put under "other labor." This space also included the time of the foreman, time-keeper, watchmen, water boy, etc. On these contracts, the pipe was supplied and delivered by the city and only such teaming as was required to haul the plant from one place to another was included under this head.

All of this information was obtained very easily and no difficulty whatever was experienced in this, but the figures required under the heading "Quantity of Work Done" were very hard to get, at first. Of course, all of the other information would be useless without knowing how much work was done, and as other contractors may have the same trouble, the method adopted will be explained later in this article.

The spaces for cement, sand and gasket used were found to be useless, as too much guess work was required. The best way to keep records of this would be to make a note in the "Remarks" column stating how many joints were made with one bag of cement, 100 pounds of gasket and one cubic yard of sand.

The information under the heading "Materials Ordered" was not hard to keep and was found very useful by the book-keeper.

Information as to the cost of excavation and backfilling is useless for future work unless a description of the nature of the ground is given. For this purpose we used a classification of our own, which however could be adopted by any person. Owing to the difference in the description of the ground as it appears to different persons we tried to arrive at some system that would make all the descriptions carry the same meaning to us as to the man who wrote them and not compel him to change his adjectives every day, principally for the sake of variation. Most people know that an HB pencil is one in which the lead is neither very soft nor very hard—in fact it is the ordinary, common, everyday lead pencil. The more letters H describing the pencil, the harder is the lead and similarly the more letters B, the softer is the lead in the pencil. We simply applied this description to the material excavated. For instance an HB clay is the ordinary, everyday clay, neither very hard nor very soft, while a 5B clay would be so soft that a man would sink to his boot tops in it. In the same way a 6H clay would be so hard that the contractor would be tempted to try dynamite on it. A description of anything is a comparison of it with something else, so that if a contractor once took out a very hard clay that cost him, say, $2 a cubic yard that would probably be his 6H clay and if he once dug a trench in which the men did sink up to their boot tops, that would be his 6B clay. There are plenty of available letters in between these to cover all classes. For instance a 1H clay never needs a pick, but can be dug out with a little manoeuvreing of the shovel. A 2H clay is best suited for a grub and is a little too soft for a pick, while either a grub or a pick answers in a 3H clay. The 4H, 5H and 6H clay all have to be picked, the chunks in the former being the size of oranges and in the latter only the size of, say, walnuts. The softer, or B clays, are classed in a similar manner.



FRY & THOROLD

TORONTO CONTRACTORS HAMILTON

Rosemount Street, Length 568 feet. Size 12 inches

DAILY PROGRESS

MEN WORKING 45

Dec. 14th 1911

LABOR	16 ~~18~~	22 ~~20~~	23 ~~22~~	25 ~~25~~	27	30	50	55	TOTAL Cost of Labor to-day $	Quantity of Work done	REMARKS
Excavation, hours		126	108	90					75 06	49 c.y.	1.53 per C.Y.
Backfilling, "		36							7 92	50 c.y.	.16 " "
Shoring "					8				2 16	36 feet	.06 " foot
Pipe laying, "										50 feet	
Other Labor, "	9				10	9	9		11 34		.23 " C.Y.
Cost of Teaming								8	4 40	Total	1.92 " C.Y.

bags of Cement used, cu. feet Sand used, pounds of Gasket used

MATERIALS ORDERED

Quantity	ARTICLE	ORDERED FROM	PRICE		REMARKS
6 bags	Cement	Wood Vallance	40	2 40	Received O.K.

Nature of Ground, 1st Five feet, HB loam for 1 foot, then 3H Clay. No water

" " " 2nd " " 3H Clay changing to 4H " "

" " " Bottom 4H Clay " "

GENERAL REMARKS

Engineer gave sight bars 400, 500, 568

Received 40 lbs gasket ordered on 13th.

1 bag Cement was used from 140 to 230 = 90 feet

Weather to-day was Fine and Cold

Contractors' Daily Progress Sheet

This system was used on the different streets and surprisingly good results were obtained. Of course if there is any water in the trench a note should be made of this and for this purpose there should be a space left for "water" and something should be noted under this head. A space should also be left for "sheeting" and a short description should be given of the kind used.

The weather should be noted, as the cost of work will vary with the weather and trouble may be avoided if the contract is not completed on time.

Having used this sheet for one season, we came to the conclusion that its principal use was to determine the value of the foreman and his gang and as a slight prod to the lazier men, but that the usefulness of the information gained as to the cost of the different parts of the work was far more theoretical than practical.

Before discussing the sheet in general, the method used to determine the quantity of work done will be described in detail. The sight rod should be divided into feet and inches, commencing with 0 at the cross piece at the top of the rod, and each foot should be plainly marked down to the bottom end of the rod. Graduated strips of canvas may be bought in the stores selling surveying instruments, and one of these hung on the rod with the 0 at the top will be found to be very convenient. The rod, prepared as above, is then held on the surface of the undisturbed ground at the point where the sewer commences and a sight is taken over the sight bars and the reading on the rod corresponding to this sight is noted. The rod is then held at points 25 feet along the full line of the sewer. If the sight bars are placed 100 feet apart, as is the usual custom, pacing will be found to be close enough for the 25-foot sights. If the contractor never attempts to keep any cost records he should at least have the rod described and carry out this much of the work because he is then in a position to check over the actual depths he has to dig the sewer with the depths as shown on the plan. The reading taken at each sight bar should be the depth shown on the plan, as all the readings on the surface of the ground give at once the cut at that place. A difference of an inch or two may be found, but this is due to the fact that the engineer may have held his rod at a different place from the contractor, and there may be a slight difference in height of the ground in the two places. The cuts thus determined should then be compared with the plan. If no sight bars are in position when excavation commences, the readings may be taken on the sides of the trench as soon as the sight bars are up.

Each night just before the men stop work the rod should be held on the bottom of the trench opposite these same 25-foot marks. The reading on the rod corresponding for any sight, where excavation is to be made, is always the depth yet to be dug, while on backfilling it is always the total depth backfilled at that point.

The handiest place to keep these notes is on a separate sheet in the ordinary time book. Supposing excavation commences on the 13th day of the month, then put all the readings on the surface of the ground under the space for the "time" on the 12th and head this column "surface." After this place the reading taken each night in the column for that day. Instead of the men's names write in the distance of each reading, from the commencement of the sewer, as 25 ft., 50 ft., 75 ft., etc., and also make a note where backfilling is completed to, where excavation ends, and where pipe-laying is finished. The difference then between the reading on the surface of the ground and the reading on any day is the total amount of the cut made. The average of all the cuts made will give the required depth and this with the width of the trench and its length, gives the quantity of work done. After a few days' practice it will be found possible to read the rod about as fast as the man can carry it from place to place and the whole operation will not take over ten minutes.

Our original object in doing this work was to determine the actual cost of excavating different classes of material, but other advantages were found which also were of great value. The first great advantage is that the depths of the sewer can be compared with the plan by means of the engineer's own levels, and while ordinarily the contractor would not do this, he is pretty sure to do so when he has the actual figures of the cuts in front of him. If the contractor were to measure the depth each night with a tape line the chances are that some of the men would get together and grumble and he would hear of it in some unpleasant way. The men, however, do not seem to mind the sight rod being placed down in the trench where they are digging, especially if one of the laborers holds it. If the foreman takes these notes he has before him each night just what the amount of cut made each day is, and very shortly he is bound to make enquiries why it is that Bill Jones always digs 6 to 12 inches more than the next man. If the foreman has the authority to fix the relative wages of the men, he will be able to pay the poor men least and all of them only what they are worth. The men will very soon see then that it pays to work hard because only the men who show results get the high wages. The foreman, also, will see that a record is being kept and that he, too, will have to get results. It is all very well to walk over a job and tell the foreman that he is not getting the work done as cheaply as you expected and give him a general calling down, but if you can go to him and say, "Now look here, Bill, this work is costing five cents a cubic yard more to take out than it was yesterday," he knows that you know what you are talking about and he will keep his wits about him in the future.

The sheet is well worth keeping until the foreman gets a good gang and gets things working smoothly, but so far as it answers the purpose for which it was designed we think that its advantages are few, because it is seldom possible to determine, beforehand, exactly what the excavation on any particular street will be like, and the figure obtained by dividing the total cost of the street by its length, together with the depth and a description of the soil, is of far more practical use than a collection of figures of the detail costs of work, for a work on which you do not know the details.

Owing to the fact that the sheets cost very little to have printed and nothing to keep, and considering that they have a general tendency to lessen the cost of the work and make a useful diary of progress, we think that in a very short time they easily pay for their cost.

Vanderbilt interests are planning the erection in New York City of a 23-storey hotel which will contain 1,000 rooms and possess many interesting features, among which may be mentioned underground stores.

Efficiency in Municipal Engineering

THE municipal engineer and his assistants, as a class, are not rarely considered by the general public, the business man and other engineers as being less systematic, capable and energetic than engineers in private employ. In fact, previous employment by a city has occasionally been found detrimental to a man who desires to make a change, says a writer in The Engineering Record. There is much less reason for this opinion to-day than ever before, but as it is an opinion which still finds expression it is worth while considering it from several points of view.

In some municipal engineering offices there is little attempt to secure an efficient and well-balanced organization, with the duties and responsibilities of its members sharply defined. The men in higher authority either endeavor to do much of the detail and routine work themselves, and thus have insufficient time to consider thoroughly the larger problems to which their attention should be directed, or they leave the details entirely to assistants who do not have an adequate sense of responsibility and have not developed a capacity to carry on work without close supervision. Sometimes this is due to inadequate appropriations for the work and sometimes to the many calls on the time of the city engineer and his leading assistants.

As for the office records, they are not always kept systematically. Field survey books and estimates are occasionally useless to all but the man who did the original work. Plans of the location of gas and water pipes, electric and telephone conduits, and sewers are often incomplete and incorrect. Property and street lines are not referred to well established points, thus opening the door to future litigation. These conditions are often deplored in the reports of city engineers and appropriations asked for remedying them, but the public does not read these reports and assumes that the engineer is responsible.

Delay and expense in conducting the business of the office are especially likely to be noticeable in the preparation and supervision of work to be done under contract, owing to lack of office system. The designs of an incinerating plant were once assigned to three different departments at the same time, neither of which was given full information upon which to base the design, and after a period of confusion the work was entrusted to one department to carry to completion. On two other works of considerable size, one a pumping station and the other a reservoir, engineers were engaged on design for over two years in each case, when a few months at the most would have been ample time for this work. This delay could only be charged to the lack of proper decision on the part of the higher authorities.

The young engineer has a tendency to design special apparatus when standard equipment will answer the purpose well and possibly be better adapted to the work. This may be due to his lack of knowledge of what can be obtained from regular stock, or it may be the result of a frame of mind revealed by a designing engineer who, upon being criticized for his practice in this particular, remarked, " it would not be real engineering to adopt standard articles for important work." No one should be criticized for attempting to improve upon what has already been done, but the engineer should look upon such matters as a business man does, and not spend time and money in this way unless the probable increase in the efficiency and durability of the apparatus will give ample returns for the time and money thus expended. These things are well known, yet there has not been that same watchfulness in public offices to keep the designing force under careful supervision that is observed in private undertakings.

Detailed Cost Records

Detailed cost records are not kept in many municipal offices, and those records which may be kept leave the costs covered up with all other expenses of the office. In making up an estimate of the cost of a piece of work to be let by contract, the engineer computes with all possible accuracy the quantities under the various items of work and their probable cost to the contractor plus his profit, and to the total of these amounts he adds a lump sum of 10 or 15 per cent. as the cost of engineering and contingencies. In other words, he goes into minute details of construction costs, but lumps his own expenses in a single big item, whereas if he were the engineer for private parties he would probably be asked to itemize his own work of design, field supervision and the inspection of materials. The engineering costs are not a large percentage of the total cost of most important works. No matter how carefully engineering cost records may be kept they can hardly be expected to bring about any material decrease in the ratio of the engineering costs to the expense of the whole undertaking. But they would surely be of considerable value in showing the efficiency of the men in the office and the field and in pointing to reasons for delay in getting out work. Most of all, they would impress upon the whole staff the need for earnest efforts to give the highest returns to the public which employs it for the money invested in its services. This incentive to efficiency, which is found in some form in every good business organization, is not so evident in public engineering offices.

Water Purification by Ozone at St. Petersburg

A large plant for the purification by ozone of water taken from the river Neva has been laid down in St. Petersburg. In this plant, which has a capacity of 11,000,000 gallons per day, the water is pumped direct from the Neva into a series of eight settling and mixing tanks, in which a small quantity of aluminium sulphate is added. From these tanks it passes to a series of thirty-eight Howatson rapid filters, in which the filtering medium is finely ground flint. Passing thence, the water is led through the emulsifiers, which are water pumps working on the injector principle. Here the ozone is added, and the mixture then goes into a series of five sterilizing towers. The purification takes place partly in the emulsifiers and partly in the towers, the delivery from the top of which is by means of a cascade, so that the water as it makes its way to the storage tank may be deaerated. The ozonising battery consists of 128 ozonisers of the Siemens and Halske pattern. Electric current at a pressure of 7000 volts is required to work this battery. A concentration of 2.5 grammes of ozone per cubic metre of air is employed. The power necessary to operate the installation is about 300 horse, and the cost of working, including that of the aluminium sulphate, is given as being from 17 to 19 cents a thousand gallons. It is stated that excellent purification results from the treatment, and that practically all the bacteria, including all those of a harmful nature, are eliminated.

Operation of Sewage Disposal Plants

Maintenance as Important a Factor as Correct Designing and Construction—Responsibility of the Engineer—Intelligent Oversight

By Chester A. Smith *

SEWAGE disposal has become a very important branch of sanitary engineering and one that requires deep study and specialization. The advancement in methods has been rapid in the past twenty years, but there is still a great field for improvement. There have been many ideas and methods advanced and experimented upon. Some have proven failures, some partial successes and others have given very good results. All of these, even the failures where the plants were taken care of and operated intelligently and the defects noted, have helped in the advancement of the methods, but where well designed plants have been neglected and abused not only the individual municipality has lost the value, efficiency and protection of the plant, but science also loses the value of principles that might have been proven or new ones discovered. In some cases such plants have been detrimental, discouraging to engineers as to results and causing a popular aversion to any similar plant.

At the present time we have nearly every type and combination in use in this country. Some are giving excellent results, others are not doing what they are capable of and others are failures and really a nuisance or detriment. We have some very good data upon the results of operation of some of the plants in the East, but in many cases they are from plants of larger cities where the composition of sewage is materially different, owing to the chemical properties of the water supplies and the large amount of manufacturing wastes, from what we have to meet in this section of the country. Very little is known of the exact results and performances of our plants. Usually if the plant is not causing a nuisance nothing is reported, but if it is there is a report and a loud one.

Influence of Public Opinion

The average city or individual considers a sewage disposal plant a novelty or unnecessary expense and they only build them when a threat of damage suit arises and then to appease the wrath of the plaintiff, or to meet the seemingly useless requirements of the Board of Health. Then any sort of a plan or device prepared or proposed by an engineer or concern will do, as long as it is not too expensive. As soon as it is built they will feel satisfied as having done their duty. Efficiency and operation matters little as long as it causes no nuisance or damage. In a few years the city officials that were in office during the construction are out, private citizens have forgotten there is a disposal plant, and it is allowed to deteriorate and become useless, a nuisance and a menace. A damage suit springs up, or an epidemic breaks out traceable to the abused plant. Where lies the blame? Public opinion says it was no good in the first place, even if it was of the best known design. Scandal is hinted, councils and engineers are accused of wanting to display their authority or of neglect of duty. As a consequence, sewage disposal plants in general are given a bad name. Something must be done. If the plant was well designed, but has been allowed to depreciate from neglect, or is outgrown and requires extension, or contains minor faults in design, it takes a daring engineer to face the public and council to recommend that any money be spent to place it on its real working efficiency. They look upon any suggestion of remodeling or recommendation relative to the old plant with distrust and would rather spend several times the amount for any other plan or solution of the problem.

Engineers are also to blame at times when disposal plants fall from grace. The plants are sometimes of faulty design, frequently minor faults that can be easily remodeled at small cost if carefully noted during operations. Some failures are due to too radical departure from established design or principles and incorporating new ideas without proper trial or experiment as to their efficiency. One of the most common faults is the over-zealousness of the engineer in disquieting or allaying doubts of the efficiency of the proposed plant. Too much is expected and when the plant does not prove up to expectations or anything does go wrong, the reaction of faith is greater.

Septic Tank Abused

For instance, the septic tank has been much abused. Municipalities are told, or led to infer from preliminary descriptions or reports, that the effluent from such a tank will be odorless, non-putrescible under any circumstances and even purify the sewage to a potable water supply. When actual operation commences and such is not the case, then it is condemned as being worthless. After installation, to obtain its full value and usefulness a plant must be maintained and operated intelligently. No matter how well designed or equipped, or what efficiency the plant is capable of, it must have attention. The importance of this must be impressed upon the city officials. This does not mean that, on the average type of disposal plant of small towns and cities of this State and surrounding States, they must keep a force of men on constant duty or pay high wages to a chemist or bacteriologist for conducting elaborate tests, but the water works superintendent, city engineer, street commissioner, or whomever the city may depend upon, can observe the operations and soon can tell by the character of the effluent if the plant is operating satisfactorily and up to the efficiency required. Simple tests for putrescibility may be made, such as collecting samples in bottles and leaving them stoppered for a week at a temperature of from ninety-five degrees to one hundred degrees, and noticing the color. Determine the daily flow of sewage and adjust the capacity of the tanks for the right period of retention or sedimentation. Sewages of different localities vary in strength according to the relative amounts of house sewage, filtration, flush water and manufacturing wastes. A little experimenting will soon decide upon the proper period

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* Before the Kansas Society of Engineers

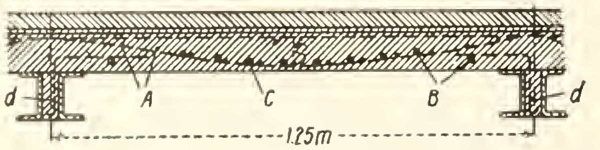
for retention in tanks, the number of doses per day on filter beds, the time of contact in contact beds, to gain the highest efficiency of purification for that particular sewage. Adjustment should be made for the change of temperature in the seasons, bacterial activity being less in the winter and greater in the summer. Care should be taken to see that the inlets of the tanks are not stopped up, overworking one compartment and not enough for another; that the filter beds are getting an even distribution of sewage, and that unnecessary dirt or foreign material does not collect on the beds and gradually work into them, causing them to clog up and reduce their capacity. Clean both beds and tanks at the proper time when the limit of safety as to capacity and efficiency is reached.

The correct operation of a sewage disposal plant many times is far more important than the operation of a water works or an electric power plant. A water main bursts and for a short time the people suffer the inconvenience of being without water at their right hand. Inconvenience and fear of possibility of fire loss urges prompt action for repairs. If a generator burns out or stops at the power house, inconvenience and small financial loss causes immediate action to resume operations, but if a sewage disposal plant becomes clogged or is allowed gradually to become worthless—no one cares much. A water supply is polluted, an epidemic occurs, then how much loss can be estimated from loss of time, sickness and perhaps a few deaths?

The World's Highest Bridge

French engineers have constructed across the gorge of the Rummel, near Constantine, Algeria, in Northern Africa, what is said to be the highest bridge in the world. A section of the reinforced concrete floor-slab is shown in the diagram herewith.

This bridge has a suspension span of 539 ft. and a clear height above water of 571 ft. It has two sidewalks and a roadway 14¾ ft. wide. The roadway alone is reinforced concrete slab, as shown by the sketch, supported on beams of twin channels spaced 4.1 ft. apart. As will be noticed, the slab concrete extends down between the channels, stiffening the beam and protecting the inside faces against corrosion.



Details of reinforced concrete floor-slab for high suspension bridge in Algeria

The reinforced slab is 4.2 in. thick, and is reinforced with a system of catenary bars having a sag of 3 in. between beams. These bars are 0.2 in. in diameter. Over the longitudinals are two sets of transverse bars 0.136 in. and 0.44 in. in diameter. The renforcement is high-carbon steel. On the slab proper is a 0.4 in. layer of cement paste in which are set asphalt blocks 8 x 4 x 1.6 in. These blocks are moulded under heavy pressure, to give them strength against compression.

Approximately $450,000 will be spent on extensions to the waterworks system at Regina, Sask., during the present year.

Sheet Asphalt Paving Mixtures

By H. B. Pullar *

During the last few years chemists and engineers throughout the country have made a great deal of progress in the chemistry and testing of bituminous materials used for paving purposes, but the same progress has not been made by contractors in the method of handling materials at the asphalt plants and on the streets, and this is most essential for producing a good mixture. There are, without doubt, a great many more failures of asphalt streets due to poor handling of materials at the plant and on the streets than can be laid to the raw materials themselves. In the construction of sheet asphalt pavements, there are so many variables to be contended with that an engineer or paving expert should hesitate before placing the blame for failure on the asphaltic cement, which forms only 10 per cent. of the pavement.

It is at the paving plant that the pavement is made, and here it is that the quality of the asphalt and other materials and the reputation of the contractor are at stake. If these raw materials are properly handled and a satisfactory mix determined for the climatic and traffic conditions of the street on which it is to be laid and the output of the plant is kept uniform, there will be little need for worry about the finished pavement.

If engineers, inspectors and contractors would consider more seriously the conditions at the paving plant and the uniform handling of materials, it would result in much better pavements and would be of much more benefit than the drawing of strict specifications for raw materials. In fact, at the present time, one of the largest paving contractors in the country finds it both wise and economical to put at each of his paving plants a graduate chemical engineer, whose sole duty it is to look after the quality of the raw materials and their proper handling at the plant.

Temperature an Important Consideration

Among the most important features at the paving plant are the temperatures. These vary according to the asphaltic cement used, and the climatic conditions. There are a number of asphaltic cements on the market which are very easily injured by overheating, and which require different handling at the plant, and it would be well for contractors and engineers, before starting work, to make a thorough investigation as to the method of handling the bituminous material which they propose to use, and especially in regard to the temperatures which it will stand without injury.

In sheet asphalt, sand is the principal ingredient and naturally should be most seriously considered. It should be clean and moderately sharp, the grains varying in size from 1-8 inch in diameter to those passing a 200-mesh screen. While it is advisable to follow some definite grading which has given successful results, it is not impossible to make a good pavement out of a poorly graded sand, care must be taken to experiment with it in order to determine the proper amount of asphaltic cement and dust which must be added to give a satisfactory mixture. The engineer should be careful to specify a grading of sand which is procurable in the city in which the pavement is to be laid. After a suitable sand has been obtained, it is necessary to test the grading two or three times each day to see that it is running uniformly, and should there be any noticeable difference, the percentage of asphaltic cement should be increased or decreased to meet changes in grading.

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* Chief Chemist American Asphaltum and Rubber Company, Chicago.

Besides the sand and the asphaltic cement, dust, Portland cement or other fine inorganic material is the other ingredient used in sheet asphalt pavement mixtures. It is necessary before determining upon a mixture that a study be made of the traffic conditions of the street. The dust is used to stiffen up the mixture and the percentage used depends upon the above conditions and the sand grading. For instance, for a heavy traffic street, it is advisable to use from 10 to 15 per cent. of Portland cement or dust, while on light traffic streets this may be reduced to 6 or 8 per cent. with very satisfactory results.

Mixing and Handling

Providing the necessary raw materials are satisfactory, the next important requirement is that they are properly mixed. The sand should be uniformly heated to a temperature of approximately 350 deg. F., at which temperature it should be combined with the proper amount of cold dust and the two mixed for a period of about 15 seconds. The asphaltic cement should be heated to a temperature of from 250 deg. F. to 350 deg. F., depending upon the kind used, and then added in the proper proportions and the mixing continued at least 45 seconds longer. As this mixing is probably the most important feature, it is necessary to have a first-class mixing man in charge, and it is a lack of capable men in this capacity that has been the principal cause for a large number of failures in sheet asphalt pavements. It is very easy for a mixing man, if he is at all careless, to put in a few pounds too much or too little of asphaltic cement or to dump a box before it is properly mixed, which when it gets to the street mixed with other boxes, is unnoticeable but which in time will cause serious trouble.

Provided that materials have been satisfactorily and properly handled at the plant, there is still a chance for improper handling on the street, and there have been a number of failures due to this cause. It is both economical and good judgment for the contractor to employ only first-class street foremen, rakers and roller men, for the employment of these men insures first-class street work—which is cost essential and which, to the average person is the only important part of the pavement. The mixture should be protected while in transit from the plant to the street and dumped some distance from the part of the road on which it is to be spread. All of the materials should be turned over before raking and any lumps should be broken up. The raking should be so thorough and so true to grade that it is unnecessary to go back after rolling and retouch the low and high places. The surfacing roller should be used as soon as the material has cooled sufficiently to allow it, especially in cold weather. This gives the initial compression and, if properly done, is of great assistance for the final rolling. The final rolling should be continued until the surface is thoroughly compacted, is smooth and shows no sign of roller marks. It is too often the case that a fair amount of rolling is considered sufficient, and engineers, inspectors and officials should insist upon the proper amount.

The writer has now given an idea of a few of the many variables to be contended with in the laying of sheet asphalt pavements and, as has been stated above, believes if more care is taken in the proper handling of the raw materials and of the finished mixture, by contractors and engineers in charge of paving work, it will result in the laying of much better pavements, in lower maintenance costs, and in an increase in the demand for this very serviceable class of pavement.

The Chief Engineer of the Montreal Water & Power Company

Mr. Frank H. Pitcher, Chief Engineer and General Manager of the Montreal Water & Power Company, was born in Montreal in 1872. He is a son of the late Rev. J. Tallman Pitcher, and was educated at McGill University, where he graduated as a Bachelor of Science with the class of 1894. During the next four years he was demonstrator and lecturer in Physics at McGill. He accepted a position as Engineer with the Montreal Water & Power Company in 1899, which position he held until 1901, when he became Chief Engineer. In 1903 he was appointed Manager, as well as Engineer.

Mr. F. H. Pitcher, Montreal

Under Mr. Pitcher's direction, the plant and operating system of the Company have been re-organized throughout. In addition to the construction of the new filter plant (described in this issue) electric and steam pumping machinery of the latest pattern have been put in. This company was the first in Canada to make use of electric turbine pumps and of steam, turbine-driven turbine pumps. It was also the first to install on a large scale the lock-bar steel pipe instead of cast iron for large force and supply mains of great length. The company has at present under construction, under Mr. Pitcher's supervision, a 45,000,000 gallon reservoir, which is being blasted out of the solid rock at Outremont, and which when completed will be the largest of its kind in Canada.

The present repairs that are being made to the Smith's Hill reservoir at Victoria, B.C., have been condemned as useless by Mr. R. H. Thomson, ex-city engineer of Seattle, who was called in to report. Mr. Thomson's recommendations involve an expenditure of about $40,000. In view of the amount of cheap experimental work that the council has been carrying on for a number of years it will be interesting to see whether Mr. Thomson's recommendations are approved.

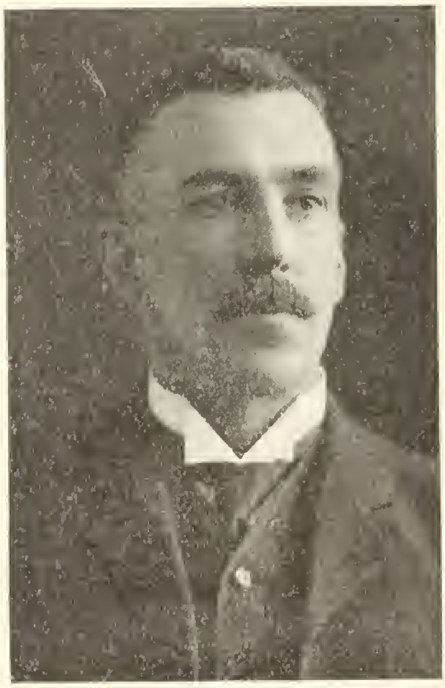
Efficient and Economical Dust Laying

Unsatisfactory Character of Water Sprinkling—Artificial Dust Layers — Use of Calcium Chloride in Halifax — Cost Data

THE following is an extract from an interesting paper dealing with the prevention of dust on roadways, given by Mr. F. W.W. Doane, City Engineer of Halifax, N.S., at the recent annual convention of the Union of Nova Scotia Municipalities. Mr. Doane's introductory remarks were devoted mainly to a consideration of the hygienic objections to dust. Mr. Doane emphasized the importance of the question by quoting eminent physicians who contend that dust is a distinct menace to public health and that it is particularly the enemy of advanced age.

MR. F. W. W. Doane:

The problem of dust abatement differs for the several kinds of roads and pavements. Dust should be removed from hard pavements; but the use of the so-called dust preventives and surface treatments on pavements subjected to heavy mixed traffic, is entirely wrong in principle, as sanitary conditions require the constant removal of filth from streets and if this is removed periodically, the effectiveness of these processes is curtailed. On the other hand in the case of broken stone roads without artificial binders, the dust must be retained on the surface, since the life of the road depends upon the binding together of the larger particles of the metal by the cementing action of the fine material and by moisture. This does not mean that it is wise or necessary to leave dust inches deep to bind the metal.



City Engineer Doane, Halifax, N. S.

Since the majority of the roads of the country are earth, gravel or water bound macadam, one of the chief phases of the dust problem is the laying of dust on these roads. It is generally conceded that water sprinkling, at least by the methods commonly employed, is not practicable for the majority of such roads on account of the frequent difficulty of obtaining water near at hand, and the consequent excessive cost. Therefore various artificial dust layers have been produced, many of them acting with water to produce the desired effect.

Application of Calcium Chloride

With the exception of calcium chloride they are bituminous materials; and its effectiveness depends upon its property of retaining moisture applied to the road surface and absorbing moisture from the atmosphere. It is applied by either the "wet" or the "dry" method. By the first it is dissolved in water and applied from an ordinary sprinkling cart, a solution of from 1 lb. to 1½ lbs. to each gallon of water being used.

The second method is especially applicable where water is not easily obtained. By this method the dry material in its granular form is spread directly upon the road and allowed to dissolve by the absorption of moisture from the air. One pound being said to attract and retain from 1 lb. to 1¼ lbs. of water from the atmosphere. The manufacturers recommend the use of about 1½ lbs. to the square yard of road surface for the first application, though smaller amounts may be used with satisfactory results. For the second, and subsequent applications, less than 1½ lbs. per sq. yard may be used.

The number of applications required in a season is governed partly by the traffic on the road, but more by the weather conditions. As its effectiveness depends upon the presence of water, the relative humidity of the atmosphere largely determines the time an application will last. Shaded roads, also, will require fewer treatments than those exposed to the sun.

A manufacturer from whom quotations have just been received, states that he can lay calcium chloride down in Halifax in not less than two ton lots at $16 per ton, net cash 30 days. He states that a road to which calcium chloride has not been previously applied should be watered thoroughly twice with this solution, an interval of one day being allowed to elapse between the waterings. For this treatment one hundred yards of road, 8 yards wide, that is 800 sq. yds. of road, will require about 600 gallons of the solution, 300 gallons for the first and 300 gallons for the second watering. For subsequent treatments, one thorough watering will suffice each time, using about 300 gallons, and this will probably have to be repeated about four times a year on an average, but it is impossible to give a definite figure, as so much depends on the dryness or otherwise of the season, the quality of the road and the quantity and character of the traffic.

To make the solution, take the required weight of calcium chloride broken into pieces about the size of a man's fist and put into the cart before adding the water. Fill up with water and wait until it is all completely dissolved. Stirring greatly facilitates the solution, so always stir up the solution in the cart before using.

This remedy has been used in a number of places. The estimated cost of treating has been placed at about 4 cents per square yard for the season from May 1st to October the 15th.

Use and Cost of Road Oil

Standard Emulsifying Road Oil, as its name implies, is a petrol product which has been emulsified to render it mixable with water. In use, it is mixed with varying amounts of water and may be applied by means of an ordinary water sprinkler. It imparts a brownish color to the road surface and its effects, like those of most dust layers other than water, are accumulative, less material being ordinarily required for each successive application.

In Montclair, N.J., about 60 miles of street were kept dustless during the season of 1910, the superintendent of roads reporting that the oil is more satisfactory than water and the cost was about the same.

In Waltham, Mass., the cost was 2¼c. per sq. yard, and the results stated to be satisfactory.

In Springfield, Mass., the cost, exclusive of street cleaning, wear and depreciation of carriage equipment, was 2c. per sq. yard.

Tarvia "B" is a proprietory road preparation applied for dust suppression, and is manufactured from tar. In treating a road, the surface is swept clean and the material applies generally by distributors. The sweepings previously removed from the surface, sand, dust or similar materials, are then spread over the surface of the road, and the road opened to traffic. As a rule, it is claimed that one application per season is sufficient, repairs necessary being made by patching.

The average cost in Westfield, N.J., in 1910 was 3½c. per sq. yard; at Plainfield a little more; at Philipsburg 3 1/10c. and in Brooklyn, New York, the cost was about 2c. and the roads were kept dustless for a period of about 60 days after each application.

The different materials are being used for experimental purposes in many places. The oils mingle with the particles of dust and prevent their being carried into the air by a whirl of air or by wheels. The tars spread a thin film over the surface where it is hard, and prevent the dust from flying, and the chlorides make the dust wet and so keep it down. In each of these cases, the result is only for a few weeks at most. The treatment has to be renewed frequently and is never permanent. In France, the engineers, and shortly after, the public generally, pronounced these results ineffective, except at considerable cost and as is well known, the roads in France are the best in the world.

Dust prevention is an art requiring the careful exercise of trained brains as well as the presence of a sprinkling device filled with a sticky fluid. Road oiling is done so poorly in many places that the oiled roads are a nuisance rather than a relief. Zealous salesmen are hurting their own interests by telling people it is only necessary to put "plenty" of oil on a thoroughly dried road to keep down the dust for a year. This is arrant nonsense. Experience in this country shows that oiling a road to be successful requires careful attention to a number of details or the road will be more disagreeable than before treatment. The black greasy mud of an overoiled road or of one oiled while damp, has made many a house so grimy that dust prevention is considered worse than the dust itself. It is evident that this year a still more annoying result of brainless road oiling will be somewhat prevalent. As a result of former complaints of excessive use of preventatives or because of a desire to make a showing for economy, an amount of oil is being used in some places which is wholly inadequate. For some reason which nobody has yet explained, the liquid is often sprinkled on a road deep with fine dust and particles of refuse from countless sources. This dust cannot be consolidated by oil or anything else into even a fair road surface. When a small quantity of oil is sprinkled on it, the dust and oil form little pellets of sticky mud lying in a mass of barely moistened dust. The road is perceptibly better for a few days but after the first dry week, travel produces just as much dust as there was before, and it is more disagreeable because the slight amount of oil in it is irritating to both the nostrils and eyes. Even where the road is fairly well cleaned before oiling, which should almost invariably be the case although it rarely is, the use of only a small amount of oil will result in offensive dust during long periods of dry weather and heavy travel. This has been observed many times of late in this country and the "Surveyor" has called attention to its occurrence in England, where dust prevention work is better conducted than it is here as a rule. When such conditions arise, the road ought to be swept, for if this is not done it will be as disagreeable as an untreated road.

An Expensive Luxury

The cost figures show that the treatment of roads to prevent the dust nuisance is a luxury. The estimated cost to the City of Halifax to keep down the dust on its most important residential street is $700 if it cost only 2c. per sq. yard, and $1,400 if it cost 4c. per square yard. The length of this street is only 1¼ miles, while the total amount paid by the city for sprinkling the remainder of its 100 miles of streets is under $2,000. In this city, the greater part of the sprinkling is done with horses and drivers which are employed by the city in any case, and by means of which the work is done without the expenditure of any money except that for ordinary wear and tear. No doubt the same conditions exist in a great many of the towns.

It is therefore evident that the dust cannot be kept down without the expenditure of some money, and as the financial question is a serious one in all municipalities, the extent of road mileage on which it would be possible to apply the dust preventatives, must be limited. The problem seems to be a very difficult one to solve unless the work is paid for upon a system similar to that in force in Halifax in connection with the construction of street pavements and sidewalks. In many cities of the United States the street sprinkling is paid for by the owners of property fronting on the streets on which the work is done, and doubtless the dust laying is paid for by the same property owners.

The problem of efficient and economical dust laying is one of constantly growing importance, and it is hoped that the data given will prove of use to those seeking its solution.

The Carpenters and Joiners' Union have notified Winnipeg builders that on and after June 1st, 1912, they will demand a rate of 60 cents an hour for an eight-hour day.

Mill Construction with Steel Frame and Tile Walls

By John O. De Wolf

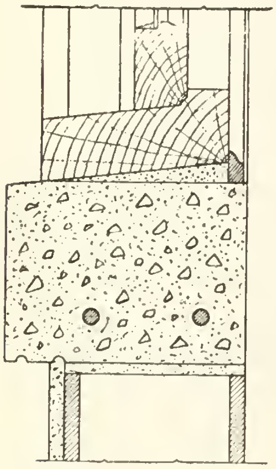
IN connection with some new buildings for a manufacturing plant, during the past year the writer made a study of different styles of construction with a view to determining that which would be the most suitable and economical for the conditions under consideration. The plant already had buildings of slow-burning mill construction and of reinforced concrete, each of which served its purpose admirably. There was no need for attempting to match in appearance the existing buildings, and the way was therefore clear for the erection of whatever seemed the best.

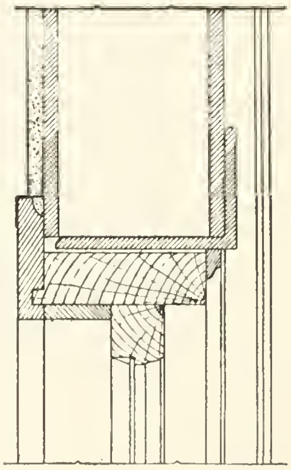
After studying the problem and making estimates on different kinds of construction it was finally determined to use plank and timber floors, wooden columns, a steel outside frame and walls of hollow tile plastered on the outside. Concrete pilasters were to be used outside of the steel columns of the frame. The result of this construction was so satisfactory that the writer believes a description of it may prove of interest.

The building is three storeys in height, with a basement, and is designed to permit of the addition of a fourth storey if desired at some future time. As it was erected on filled land, piles were necessary. The foundations were of reinforced concrete, designed to serve as a retaining wall for the basement as well as to support the structure above.

These walls were carried a little above grade and bolts set in them to anchor the steel columns.

The basement height is 10 feet from floor to floor and the height of the other storeys is 16 feet. The floors were figured for about 100 pounds per square foot, live load, and the floor beams were two 8-inch by 16-inch hard pine timbers bolted together. Bays were 9 feet 3 inches in width and the span of the timbers was 24 feet. The main floor was of 4-inch plank, splined, and covered with seven-eighths of an inch of maple flooring. Round wooden columns were used and cast iron caps and pintles. In general the interior of the building followed the familiar lines of slow-burning mill construction.

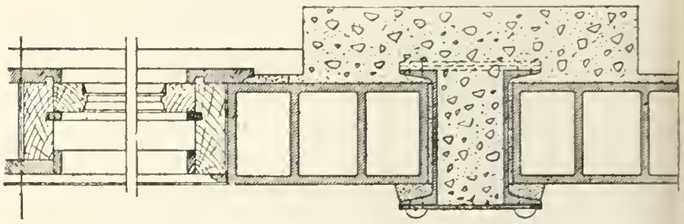

Section through sill of window


Section through head of window

The outside frame of the building was made of built-up channel iron columns and horizontal irons tying the different columns together and forming lintels over all door and window openings. In designing the columns special attention was given to adapting them to receive the tile curtain walls and the concrete that was to form the pilasters.

Plenty of light was desired in the building and the windows were made about 6 feet 11 inches wide by 11 feet 3 inches high, outside measurement of the frame. These were of the mullion type with swinging transoms and double hung sash, each sash having nine lights of 11-inch by 15-inch glass, and each transom six lights, 11 inches by 14 inches.

Only two sizes of tile were used, all being 6 inches thick and most of them being 12 inches square, but some half-size tile, 6 inches by 12 inches, were used. An important consideration in the column design was the use of such size of channels as would suitably receive the tile curtain walls. As tiles 6 inches thick had been decided on they fitted well in to eight-inch channels, and the latter also figured of suitable strength for the loads that were to be carried.


Section through column and pilaster

Instead of following the standard practice as to the distance apart of the channels forming the columns, it was varied a little in order that the tile should fit without cutting. Whatever variation was necessary on this account was provided for either in the width of the window mullions or the width of the channel columns, and the design was so worked out as to fit the two sizes of tiles previously referred to.

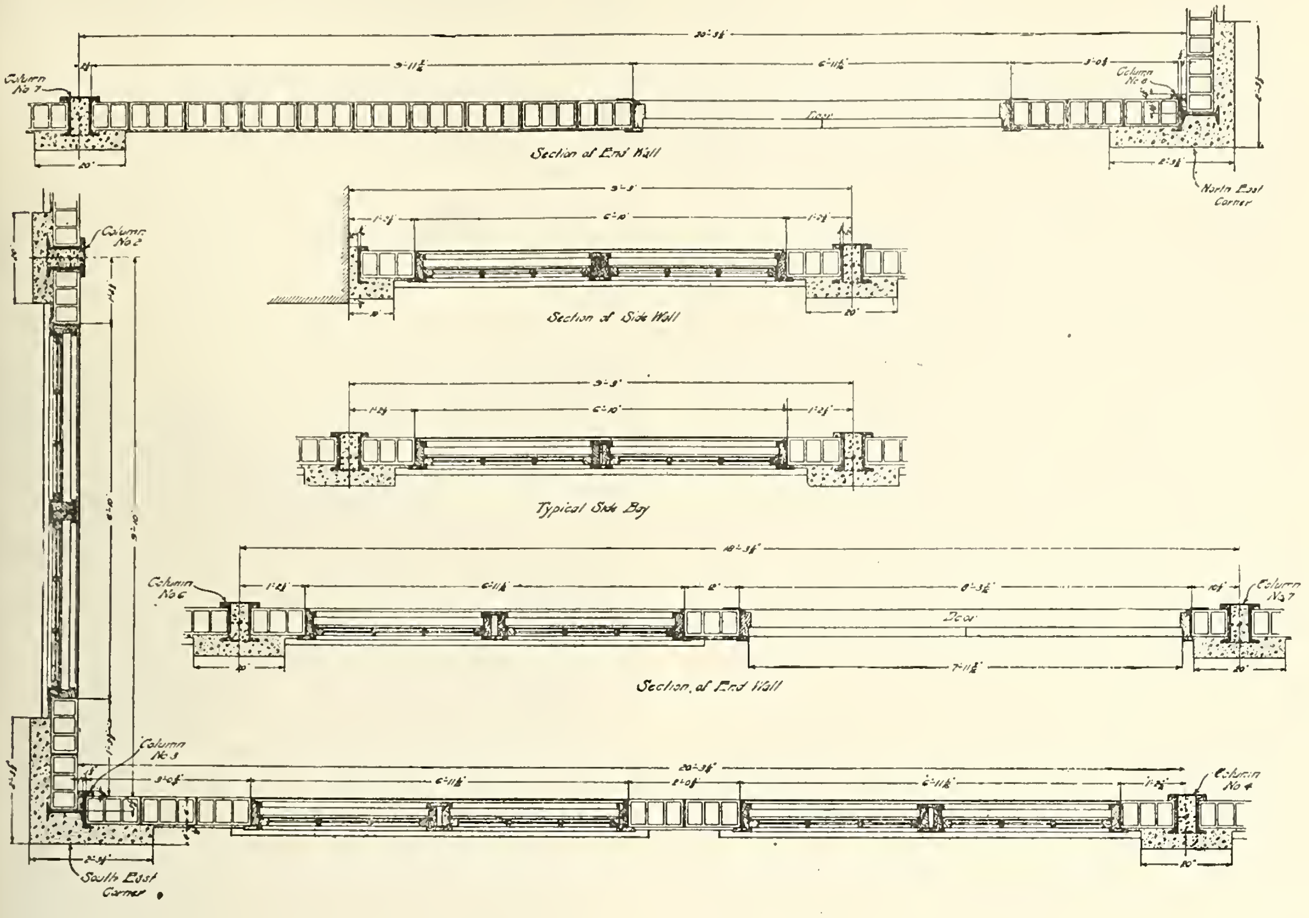
Great attention was paid to this detail, as it was not intended to plaster the building on the inside, and it was realized that any cutting of the tiles would probably appear unsightly and would also delay and add to the expense of the construction.

Over all window and door openings angle iron lintels were placed to support the tile and prevent its bearing on the window or door frames. These lintels were rivetted to the columns and thus securely tied together all of the steel work.

In designing the building it was decided to use pilastered construction. The pilasters were designed to be of concrete and to enter into, and form a part of, the steel columns. To permit of this the channel iron columns were made with plates on the inside of the building and lattice work on the outside. The plate on the inside gives a smooth appearance and obviates the necessity of any form work to retain the concrete when it is being poured.

No forms were necessary for the concrete pilasters except on the outside. The pilasters were 20 inches wide and projected 4 inches beyond the face of the curtain walls. As the outsides of the columns were latticed, the concrete entered and filled them and added materially to their strength. The finish on the tile curtain walls was cement plaster. The tile was smooth on the inside and grooved with dovetailed grooves on the outer face, so as to better retain the plastering.

After completion and painting the inside of the building presents a very neat appearance. Most of the tiles being 12 inches square, the walls show a uni-

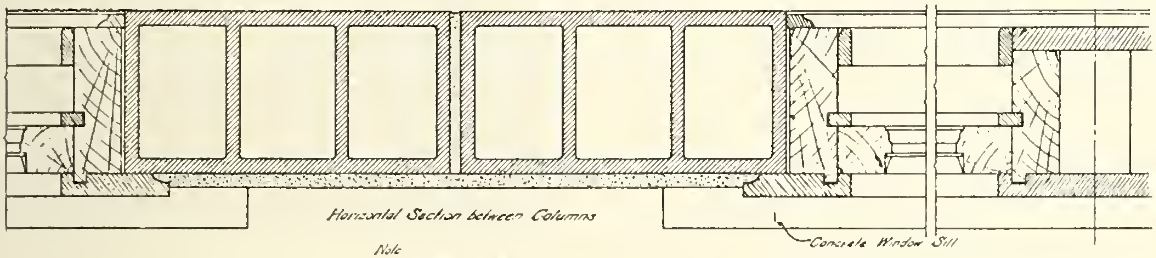


Section of End Wall

Section of Side Wall

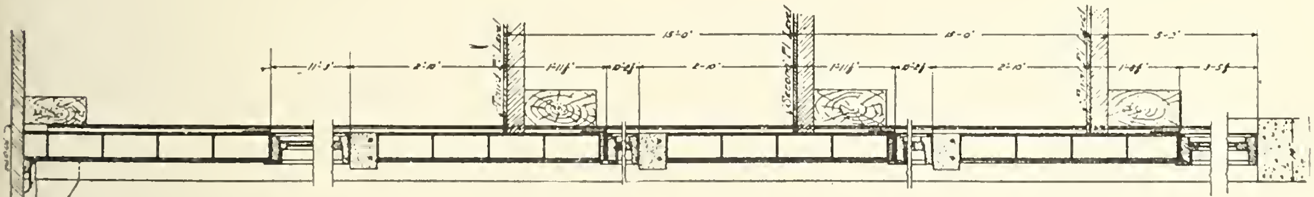
Typical Side Bay

Section of End Wall

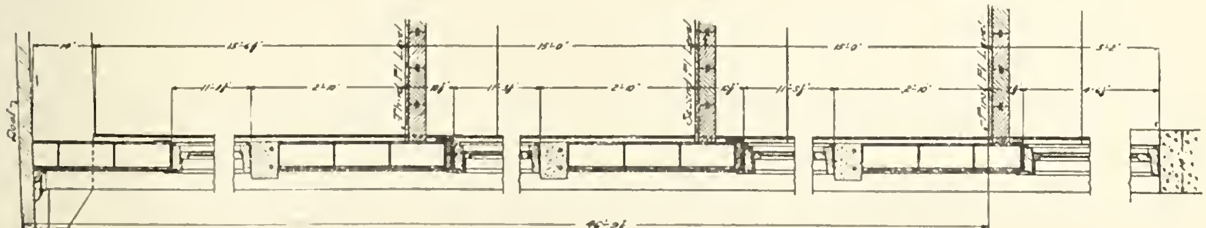


Horizontal Section between Columns

Note
Beam seats not shown on this drawing.



Vertical Section through End Wall



Vertical Section through Side Wall

formity in surface and are divided into 12-inch sections in place of the customary small sections in brick walls. Each column projects inward from the curtain walls about an inch and a quarter and is studded with rows of rivets at each edge. Under each window is seen the window sill, which is of reinforced concrete 6 inches thick. These sills were cast of such shape that on the inside of the wall they are the same length as the window opening, but on the outside they are enough longer to receive the finish at the sides of the window.

These steel, tile and concrete walls compared with heavy brick walls show economy in the cost of construction and a greater amount of available floor space. In this building each of the three upper floors is of the same size and there is no increase in the thickness of the walls at the lower storey. At the pilasters the total thickness is only about 12 inches. The air spaces in the tile walls prove excellent nonconductors of heat and give a wall that has been found well adapted for economical heating.

This building is not being used for rapid-running machinery, but the use of a steel frame with concrete pilasters in connection with the columns would undoubtedly give all the rigidity that would be necessary for any ordinary manufacturing purposes, and this construction would seem to have many uses in industrial buildings.

Loft Buildings a New Feature in Montreal

Modern building methods are bringing to light many new features in the construction and uses of large structures and changing the character of sections of our more important cities. One of the new types is the "loft" and light manufacturing building. This is usually of reinforced concrete, with as large a ground area as it is anticipated can be built upon profitably and as great a height as the law will allow. Building laws differ in different cities. In Montreal, ten storeys, or 130 feet above the sidewalk level, is the limit.

Within the past two years a number of such buildings although not to the full height, have been erected in the vicinity of Craig, Bleury, St. Alexander, and Dorchester streets. A new and larger one is now being planned for construction on the southwest corner of Lagauchetiere and St. Alexander streets. This will be known as the Unity Building, and will be erected by the Unity Building Company, which is being promoted and financed by the Industrial Securities Corporation (Inc.) with offices at 103 St. Francois Xavier street. The officials of this company are Mr. W. D. Hart, president; Mr. S. M. Luke, vice-president; and Mr. John Rose, secretary.

The Unity Building will be 130 feet high, and will contain ten storeys and basement. The frontage on Lagauchetiere street will be about 160 feet. The site, which is irregular in shape, will have a total area of 13,500 square feet and cost over $100,000. The building to be erected upon it is expected to cost $300,000. The residences now occupying this site will be torn down immediately after May 1st, when the construction of the new building will be commenced. The foundation will be of concrete carried on a concrete raft. The first two storeys above the foundation will be of limestone, and the superstructure will consist of reinforced concrete and terra cotta faced with Laprairie plastic brick. The ceilings will be of the flat type. The walls will be painted with cold water paint. Conduits will be built into the walls to carry the electric wiring for both light and power. The whole structure will be of fireproof material except the flooring, which will be of hard wood laid in concrete. The doors and windows will be of metal. The greater portion of the glass will be wired. The stairways will be iron, and the treads of incombustible material. The entrance will have a terazza floor with a tile base, and wainscot and marble border. The building will be heated by steam, a system of overhead pipes being used. For fire escapes, stairways will be built in independent towers at the back of the building which will be shut off from the rest of the structure, by fireproof doors. A sprinkler system will be installed, and there will be three elevators as well as all other modern equipment and conveniences to be found in a building of this kind.

Unity Building, Montreal

The architects are Messrs. Finley & Spence, and the contractors, The Bishop Construction Company, Limited, of Montreal and Toronto.

Filling holes in concrete walls left by the tie rods of the forms has been done by forcing corks into them and then ramming the holes with grout. A negro workman at one of the filter beds at New Orleans thoughtlessly jammed the cork of an empty bottle into one of the holes he was supposed to fill with grout. An engineer saw this and shortly afterward ordered enough corks to fill all the holes, which had previously given more or less trouble from leakage. Corks slightly larger than the holes were used and rammed to the centre of the wall with a rod having a collar several inches from the end and provided with a metal weight arranged so that it would slide along the rod and act as a hammer. The remainder of the hole was then readily grouted.

Modern Practice in Reinforced Concrete

Inspection and Test of Materials — Care with Concrete during Early Stages of Hardening—Flat Slab and Column Construction

By C. A. P. Turner, Minneapolis

IT may not be amiss to call attention to the fact that this type of construction is no longer new and novel, but its advantages from the standpoint of utility and economy have been so thoroughly demonstrated that only those who are unwilling to keep abreast of the times are lacking in general familiarity with it. I propose merely to call attention to the well known advantages of reinforced concrete construction and then to take up those questions of design and execution which should be clearly borne in mind in order that no difficulty or accident may result in the execution of the work. From the economical standpoint I may say that for heavy warehouse construction, reinforced concrete is cheaper than the old style timber mill frame, since the price of lumber has steadily advanced and its quality deteriorated as our forests are cut away. For lighter buildings, having a capacity of 100 to 150 pounds per foot, reinforced concrete costs more than timber construction, but its advantages from the fireproof standpoint and its permanence and the reduced cost of insurance should cause the careful investor to think twice before putting up the old-fashioned fire-trap construction.

As compared with structural steel, reinforced concrete is invariably much cheaper for the skeleton of a building, and a saving in cost of from 50 to 75 per cent. of the structural steel frame may be readily effected by the adoption of the more modern type of building.

We have, in many cities, building codes distinctly adverse and unfavorable to reinforced concrete construction. These codes have been adopted, not by a careful study of test data, but rather with the idea of making it difficult for the pioneer in reinforced concrete construction to work at all. Such codes, however, are being amended from time to time; for the owner who ultimately pays the bills becomes cognizant of the increase in cost due to ordinances that are unfair to this type of work, and he is taking some interest in seeing that such rules and regulations are revised and brought up to date.

Reinforcing Material

In considering the execution of work in this line, a few remarks regarding the materials which enter into it may not be amiss:

For reinforcement, many engaged in the manufacture of bars seem to consider that anything at all is good enough to be buried in concrete work. Thus we have bars of bushel steel, a mixture of miscellaneous steel and iron scrap, more or less imperfectly welded together and placed on the market as mild steel. In ultimate strength this material generally runs about 48,000 to 50,000 pounds. It bends easily, is softer than mild steel, is lacking in strength and its quality can be readily ascertained by nicking a bar and breaking it short with a sledge, when it will show a dull instead of a bright and crystalline fracture.

Then we have the old rail stock-bars rolled from old rails. Some of this material when properly treated is fairly tough and stands a good test. Other samples of it will be found so brittle as to snap short at times in handling. It can be purchased as a rule at $2 to $3 a ton under the market price for billet stock; but the conservative engineer and architect is inclined to reject it entirely on the general ground of lack of reliability. Material meeting the manufacturers' standard requirements for medium steel, Bessemer or open hearth, is to be preferred.

We have received from some mills bars running from 75,000 to 85,000 pounds ultimate strength with an elastic limit of 50,000 pounds and an elongation of 27 to 30 per cent. Such material presents the desirable characteristic of unusual toughness and high ultimate strength and elastic limit, and is, as the writer looks at it, an ideal stock.

Manufacturers of all brands of Portland cement are using their best efforts to turn out a product which is as uniform as possible. As a result the statement is justified that among those brands which have been on the market for a period of five years there is a greater degree of uniformity in Portland cement than the merchant steel on the market to-day.

Ready Testing Methods

Where the contractor has no equipment at hand for making tests of the strength of briquettes, he can readily determine whether the cement is finely ground or not by feeling of it. He can readily make a boiling test and determine whether the cement is sound, without expensive equipment. This accelerated test can be quickly made and the result of the test, if the pat is satisfactory, practically removes any doubt as to the character of the material.

The strength of concrete depends:

1. On the grade of sand and the proportions of the cement to the sand in the mortar.
2. Upon the hardness and character of the coarse aggregate.
3. On the manipulation and the conditions under which the concrete is cured or hardened.
4. On the age of the specimen.

A mortar made with a very fine sand is only about half as strong as that made with coarse and medium grains, and for this reason the specification regarding the character of the sand should be given careful attention. Dust, silt and loam occurring in appreciable proportions in the sand should be cause for its rejection.

The character of the sand may be readily investigated by taking a two quart preserve jar, filling it half full of water, and then pouring in about a quart of the sand, putting on the cap and shaking well, when the coarse grains will go to the bottom, the finer to the top, and the silt and clay will settle on the surface. More than 3 per cent. of dust or clay should be cause for rejection.

Where the concrete is exposed to the weather, the aggregate should be of such material that it will weather well and will not be affected by frost. A soft, porous stone may readily cause a disintegration of the concrete work. Granite, trap rock or other hard natural stone will, of course, give a concrete far exceeding the strength of concrete in which shale or softer material is used as an aggregate.

The strength of Portland Cement concrete in compression is equal to that of our best building stone, with the advantage that it can be placed in a monolithic mass. Its tensile strength, like that of stone, is greatly inferior to its strength in compression. Concrete yields but little, the stretch being confined to a weak section. When, however, steel is embedded in the concrete and properly disseminated through it, the deformation under tension is many times greater before fracture occurs.

The conditions leading to the combination of concrete and steel for building work may then be stated as follows:—

Concrete is an excellent and trustworthy material for compression and steel for tension. Hence the steel should be distributed in such a manner as to carry the tensile chord strains and tensile web stress. To do this economically, we can reason by analogy from a truss or beam. The further from the neutral axis the more effective the unit section. Hence the reinforcement should be at the bottom of a simple beam or as close to it as satisfactory protection against heat or fire will admit. Now the beams in a building are of constant section and since a continuous beam is stiffer and stronger than a beam of the same section discontinuous over supports, the ideal concrete steel beam should be continuous and the top flange reinforced over supports. Where this type of reinforcement is used, the bars may be bent downward toward the point of contraflexure and the main tension members then can be utilized to resist shear directly.

Precautions in Early Stages

Many types of design prove satisfactory when the concrete has had ample time to thoroughly cure and harden; but during the early stages of hardening and about the time that the average foreman would remove the supports, the concrete, not having developed its full degree of strength and hardness proves itself weak in resisting shear. Accordingly the conservative engineer and designer should take the precaution of reinforcing the mass in such a manner that at this critical period of construction there will be little if any opportunity for failure to result. Ample lapping of the reinforcing bars over the supports and thoroughly tying the mass together as a monolith by the designer would have prevented the majority of disastrous failures that have occurred in the past in putting up reinforced concrete building work. In the majority of cases where failures have occurred, had the forms been left in for a much longer period no failure would have resulted and the buildings might have proved commercially successful, useful and fairly satisfactory. On the other hand, while in this sense the responsibility for failure must be shouldered by the workmen putting up the construction, the designer who failed to take these essential precautions cannot escape his share of the responsibility for the results.

The majority of failures have occurred through insufficient lap of the reinforcements over the supports and tying the work together, these failures being flour failures and in the majority of cases shear failures of partly cured concrete. Such examples as this are those of the Long Beach Hotel, the recent failure of the Prest-O-Lite building in Indianapolis, the failure of the Fairbanks building in Canada.

Some column failures have occurred in reinforced concrete buildings but they are few in number. As an example of this character, the Henele building in Cleveland, Ohio, may be cited. Here there was an unusually large amount of vertical steel in the columns but the hooping was almost if not quite lacking. A few ties consisting of hay wire wound around the reinforcement at distant intervals was the only provision made. The collapse of this building was practically complete, although undoubtedly the work would have stood up had the concrete been given ample time to cure and harden.

Flat Slab and Column Construction

During the past four or five years, the type of flat slab and column construction originated by myself has been widely adopted. In this type of building the principle of continuity recommended for beams has been carried out, and bending is resisted not only by radial forces but by circumferential stresses around and in the vicinity of the column in the upper part of the slab and in a similar manner in the bottom of the slab between supports. As we consider the flat plate about the column in bending downward the distortion of a circular section, having a center at the column, is evidently 2π or 6 2/7 times the distortion of a radial section and the work done by the circular or circumferential reinforcement may be better understood by this comparison. It is the resistance of the bending stresses in this manner which enables the use in this type of construction of comparatively shallow thicknesses of floors and enables it to develop the enormous strength exhibited in many tests that have been made upon it.

The advantages of the type may be stated as follows: Some saving of materials where the loads are heavy. The elimination of beam boxes and a saving in centering and better light obtained by the elimination of beams.

I have called attention to the failures due to the early removal of the forms, and the failure of certain designers to get up conservative designs. A few remarks regarding the conduct of the work, especially at that period of the year when the majority of accidents occur, will be in order, namely during the chilly weather of the fall and cold weather of the winter.

The hardening of concrete is a chemical action accelerated by heat and retarded by cold. In temperatures below 45 deg. F. it frequently happens that the cement lies dormant and the hardening process progresses with extreme slowness, if at all. The foreman or superintendent on the work who consider that all that is necessary is to leave the forms in place and support the mud so many days and then take out the supports and have concrete, is liable to run into serious difficulty in putting this notion into practice. As soon as the temperature is below 45 deg. F. the water used in the mixing of the concrete should be heated to about 90 or 100 deg. and the concrete put in place warm. Then the setting will progress almost as rapidly as in the summer time.

Winter Work at Fort William, Ont.

In a building, the reinforced concrete of which was designed by the writer and erected by a Minneapolis contractor in Fort William, Ont., the roof slab was cast on the seventh of last December at a temperature 15 deg. below zero. The concrete was kept hot by a number of salamanders and was not permitted to freeze. On the 15th of December, while the workmen were placing cork insulation on the lower floor, a fire started by workmen getting a kettle of pitch too near one of the salamanders and the centering under the second floor and roof was burned out. The work did not collapse but was damaged to only a slight degree. Results of this kind are in strong contrast to the work in the Prest-O-Lite building in Indianapolis, in which a complete collapse occurred after the concrete had been cast between four and six weeks.

More of the troubles in concrete work occur, not because there has been a collapse but because the work gets out of shape. Slabs and beams deflect and get out of line although collapse does not occur. It is a rather difficult matter to determine just when concrete, especially when it is put in during the chilly season, has fully cured. Driving a nail into the concrete and seeing whether it will penetrate into it or merely double over, digging out a piece and placing it over the heat of a stove and seeing whether it softens up under the heat or whether it retains its hardness and rigidity, are good and safe methods to determine whether the work will stand up after the removal of the forms; but these methods only, are not sufficient to determine whether the concrete will preserve the form intended without some inelastic deflection after the forms have been taken out. To eliminate trouble from this cause we now require a small amount of sub-centering to be left in each panel two or three weeks after the removal of the forms proper. This is an excellent precaution in carrying up the building rapidly, as it is necessary for economy to use the lumber over and over, and by removing the bulk of it and leaving a few props under the panel this inelastic deflection is prevented and the form lumber utilized to the best advantage.

In conclusion, it may be stated that in the line of concrete construction, honesty in executing work and in the use of ample cement is the cheapest policy, since a rich concrete hardens up much more rapidly than a lean concrete and the amount which a contractor could save by skinning on the cement used is lost many times over in the additional time that he will be forced to keep the forms in place; hence the experienced contractor is more inclined to use more than the amount of cement specified rather than less, as he believes in good reason that he can actually save money by using sufficient cement so that the concrete hardens quickly and he can remove the forms at the earliest possible moment.

The new Fratt Bridge, which is now being completed across the Missouri River at Kansas City, is operated by electric motors, and is arranged to clear steamboat traffic on the lift principle. Besides the unusual provision of its movable lower deck, the 425-ft. main span, carrying two railway tracks, two electric car tracks, and two footpaths, has also the distinction of being the longest riveted span ever built. The bridge is a double-decked structure, the lower platform of which, carrying the railway tracks, can be drawn up against the main bridge floor by steel cables which pass over motor-operated drums and sheaves and are counterbalanced by great concrete weights. The platform has a vertical rise and fall of 46 ft., clearing the water by 65 ft., when in its raised position. The lifting is done by two 250 horse-power 550-volt direct-current crane motors.

Winter Construction at Montreal

One of the Montreal buildings on which work has been carried on throughout the winter is that being erected for Messrs. H. Vineberg & Co., Ltd., clothing manufacturers, by the Atlas Construction Company, Montreal. The reinforced concrete work was not interfered with by the severe weather, special means having been taken to protect the cement.

The building, which was designed by Messrs. Dufort & Decary, architects, has a frontage on the St. Lawrence Boulevard, Montreal, of 105 feet, 176 feet on Duluth avenue, and 105 feet on Mitcheson avenue, making 18,102 square feet on each flat. It will be eight storeys high, the total floor space being 144,816 square feet. There will be perfect light on four sides. The building is erected on a natural rock foundation, and constructed in reinforced concrete. A feature is the absense of beams in the ceilings, which allows of unobstructed light.

Vineberg Building, Montreal

The exterior is to be finished in granite, and the whole structure will be absolutely fire-proof; in fact, it is claimed to be the most complete fire-proof building in America. Additional protection against fire is provided by automatic sprinklers connected to the city high pressure with two 6-inch mains; also by a 20,000-gallon tank on the roof. The building will be further equipped with automatic fire alarms, operated by the sprinkler heads.

The electrical installation will be of the most improved type, concealed in condulets for light and power for machines. The elevators, both passenger and freight, will be operated by electricity, and will have a speed of 200 feet per minute.

Design of Isolated Steam Plants for Generating Electric Current in Factories and Office Buildings

By J. P. Lisk

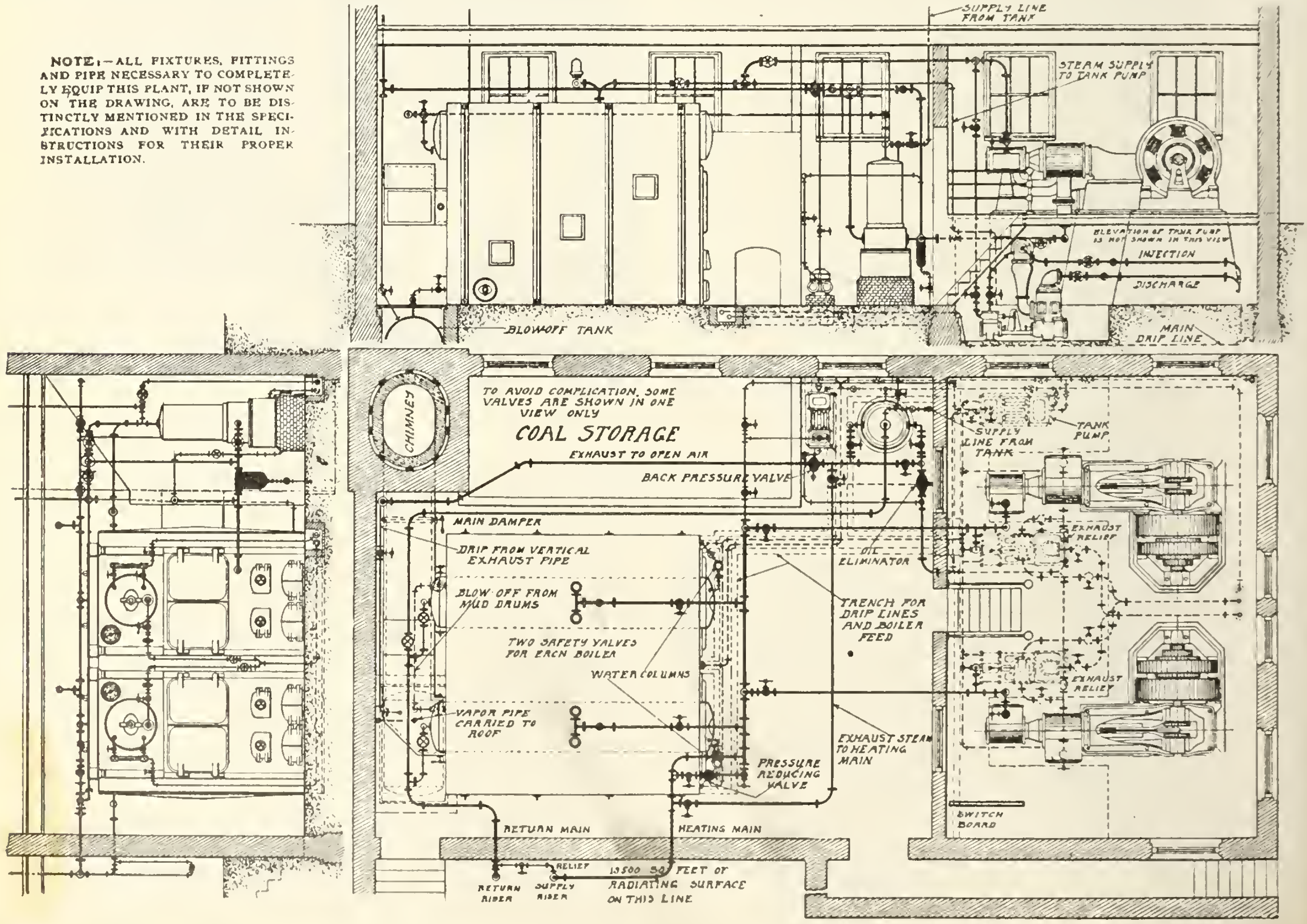
During the past few years, the rapid development of electric drive for factory work has brought about the individual centralized steam power and electric generating plant, ranging from 50 kw. to many thousand kw. capacity. Naturally there is a wide diversity in the detail of these installations, due to local conditions, and magnitude of the plants' output. The economy of operation is, as should be, the governing factor in the design of any plant, large or small, not forgetting, however, when making up the fixed charges, to include the interest on the investment, as that in a small plant is relatively greater than in the plants generating 1,000 to 5,000 kw., for in the larger plants, even though they have many expensive labor saving and heat economizing devices that cannot be profitably applied in small plants, the cost of apparatus to deliver a unit of work, is very much less.

It would not be good judgment to put in a plant, with high-grade water-tube boilers, compound condensing engine, mechanical stoker, heat economizer, mechanical draft and cooling tower for cooling the condensing water, all in duplicate and cross connected, to deliver 150 kw. at the switchboard of a factory building, in any part of the world where fuel is under $15 per ton, delivered at place of consumption. The actual saving in fuel only, of a plant with all of the above enumerated features, properly designed and erected, and operated by a man of sufficient ability to get the very best results, would not amount to 15 per cent. of that required to furnish the same power, with a simple medium pressure high-speed equipment, as commonly installed.

I mention the fuel, as that is the one important item saved. The additional items of oil and packing, also extra attention and repairs, are generally overlooked when making comparisons, but they are in the bill and must be paid for, just the same.

The following example shows approximately the difference in fuel consumed per day, of eight hours, by the above described plants; 150 kw. is equivalent to 198 electrical horse-power and for a simple medium pressure high speed engine $3\frac{1}{4}$ pounds of coal per electrical horse-power per hour is about the average coal consumption.

$\frac{198 \times 3\frac{1}{4} \times 8}{2{,}000} = 2.574$, the amount in tons for a day's run, and will also provide for banking, cleaning, and re-starting the following morning. This, of course, is service, not test conditions. I presume that every one interested in steam engineering knows that plants are not operated for any great length of time under test conditions, it is too expensive. The cost of 2.574 tons of coal at $6.00 per ton=$15.44. I said a saving of 15 per cent. of the total amount. Supposing we say 20 per cent. could be saved by installing all of the fixtures and apparatus mentioned for a compound condensing, fuel economizing and labor saving plant. The amount saved in dollars and cents for fuel only, would be $3.08 per day, or $964.04 per year, which would be 10 per cent. on $9,640.00. That looks like a lot of money, and would naturally appeal to the


NOTE:—ALL FIXTURES, FITTINGS AND PIPE NECESSARY TO COMPLETELY EQUIP THIS PLANT, IF NOT SHOWN ON THE DRAWING, ARE TO BE DISTINCTLY MENTIONED IN THE SPECIFICATIONS AND WITH DETAIL INSTRUCTIONS FOR THEIR PROPER INSTALLATION.

SUPPLY LINE FROM TANK
STEAM SUPPLY TO TANK PUMP
ELEVATION OF TANK PUMP IS NOT SHOWN IN THIS VIEW
INJECTION
DISCHARGE
BLOWOFF TANK
MAIN DRIP LINE
CHIMNEY
TO AVOID COMPLICATION, SOME VALVES ARE SHOWN IN ONE VIEW ONLY
COAL STORAGE
EXHAUST TO OPEN AIR
BACK PRESSURE VALVE
SUPPLY LINE FROM TANK
TANK PUMP
MAIN DAMPER
DRIP FROM VERTICAL EXHAUST PIPE
OIL ELIMINATOR
EXHAUST RELIEF
BLOW OFF FROM MUD DRUMS
TRENCH FOR DRIP LINES AND BOILER FEED
TWO SAFETY VALVES FOR EACH BOILER
WATER COLUMNS
EXHAUST RELIEF
VAPOR PIPE CARRIED TO ROOF
EXHAUST STEAM TO HEATING MAIN
PRESSURE REDUCING VALVE
SWITCH BOARD
RETURN MAIN
HEATING MAIN
RELIEF
RETURN RISER
SUPPLY RISER
13500 SQ FEET OF RADIATING SURFACE ON THIS LINE

Plan of power plant to run condensing or non-condensing, equipped with all necessary fixtures to supply electric current for driving and steam for heating a manufacturing establishment.

owner, but there is another side to the story. The simple medium pressure duplex plant would cost about $18,000, while the other plant mentioned would cost, on a very conservative estimate, not less than $32,000, according to my experience from 35 to 40 per cent. more than the simple plant.

The accompanying plan shows a system with all of the necessary fixtures for power and heating purposes. The heating may be accomplished with exhaust or live steam, returns delivered by gravity or mechanical means. The boiler is designed to furnish steam at a high pressure (from 80 to 125 pounds gauge) for the engines and pumps, and by the use of a pressure reducing valve, steam at any lower pressure to the heating system.

It is customary to use the exhaust steam from the engines for heating purposes, and various methods of its application are in use. The most common one is shown by the plan. The exhaust main is led to a vertical pipe through which the surplus steam may escape to the open air, when the heating system is in operation, or allow all of the steam to escape when it cannot be utilized for other purposes.

From the main a branch is taken to a feed water heater and receiver. Passing through this it is led to, and connected with the heating main.

One of the fixtures on this is an oil separator, which should be placed as near the engine as convenient. The drips from this should receive proper attention, care being taken to prevent the possibility of the separator becoming imperative by the stopping up of the drip or discharge pipe. It is one of the minor parts of a steam plant, but serious results may follow if oil from the engines gets into the heater, the heating system or the boiler.

In a convenient location, near the vertical exhaust pipe, a back pressure valve is placed. It is an important factor in a heating plant and should be of good design, properly proportioned for the work it will have to do. The pipe leading to it should be drained of the water of condensation to avoid the possibility of water hammer, which would be injurious to the valve, probably wrecking it or rendering it inoperative.

The feed water heater should receive more than passing notice, for, if it is not adapted and properly proportioned to the work to be done, its operation becomes a source of expense instead of economy. Therefore, the nature of the work should be thoroughly understood and a heater should be provided that will do it most economically. There are many types of heaters on the market. Generally, each type is adapted to a certain class of work, and, when working within its limit, gives good satisfaction. No one type is adapted to all conditions. The heater shown on the plan is one of the open type, mingling the exhaust steam with the water to be heated; also having a chamber that acts as a receiver for the return water from the heating system. From this chamber a connection is made to a pump which returns the water to the boiler, with any additional water the boiler may require to make up for losses occurring by exhaust steam escaping through the back pressure valve, drips from the oil separator, cylinder cocks, and air lines from the radiators.

The pump is controlled by a pump governor and therefore requires no attention from the engineer. Right here questions might come up that would be hard to settle if it was not mentioned in the specifications; that is, is it necessary to have two feed pumps? How will they operate in connection with this system? How will the water required to supplement the water of condensation from the heating system be put into the boiler? These are not troublesome questions to settle in the design of the plant, but if left until the work is nearly completed and the superintendent in charge wants extra pumps, and the heating contractor has determined that, according to the nature of the work only one pump is needed, delay and contention follow, until one side or the other gives way. The heating contractor is generally the one, and supplies the extra pump out of his own profits—if there are any.

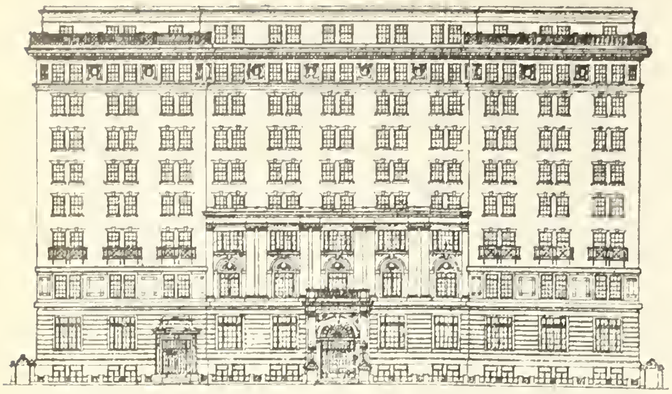
Operation of Heater and Receiver

Without going too much into the details of this part of the installation, I will say the operation of the combination heater and receiver is as follows: The return water enters at the top, falling into a spray box. Overflowing the spray box it falls into a pan below, and by a system of pans, one below the other, until it reaches the main body of water in the receiving chamber. As the water is spread out into thin sheets the exhaust steam coming in contact with it heats it to the boiling point and, as the water is flowing over the surface of the pans, opportunity is given for the lime or any other impurity in a solid form to deposit. Only the steam required to heat the water comes in contact with it, the balance passing on to the heating system, or to the atmosphere. Connected to the pump is a pump governor which controls the speed of the pump through the variation of the water level in the receiving chamber.

As the water rises in the chamber, the speed of the pump increases, consequently delivering more water to the boiler. Now it will be seen that, to make up for the losses before mentioned, enough water must be admitted to the heater from the source of supply to keep the water level in the boiler at the proper height. With the water tube boiler for high pressure this requires considerable skill in the fire room, as the amount of water in the boiler is small in comparison with the water in a fire tube boiler of the same rating.

Another feature of the system is the arrangement for using low pressure steam direct from the boiler and returning the water of condensation by gravity. When the engines are out of service there is no need to carry a pressure of 125 pounds on the boilers, but letting the pressure drop to 10 or 15 pounds gauge, cut out the reducing valve, open the main stop valve to the heating system, close the valves in the exhaust pipe, open the valve in the main return pipe, and the system will then operate from 0 to 15 pounds gauge, returning the condensation by gravity. The various valves and the offices they perform are indicated and explained by notes on the plan.

In this connection, I will mention a thing that receives very little attention until necessity forces it into prominence, and that is the kind and size of feed and return nozzles for the boiler. Boiler manufacturers have a rule for calculating the size of steam and feed nozzles for their boilers and if it is not distinctly mentioned in the specification that a certain size is wanted, the boilers will be furnished with the regular sized nozzles, in accordance with this rule. The water tube boiler is a feature of up-to-date engineering. Many are being installed in the various kinds of buildings that require power and heat, and give satisfaction when properly managed. That a



Proposed Central Y. M. C. A. Building, Toronto

Estimated total cost, $529,660
Architects, Messrs. Burke, Horwood & White

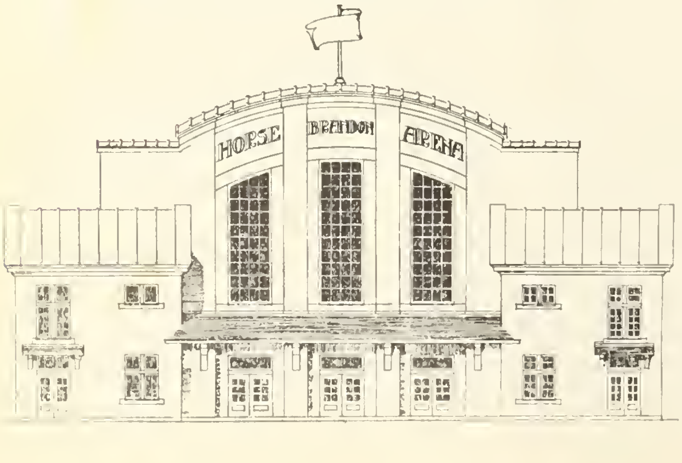
water tube boiler requires more attention than the fire tube type is an indisputable fact, and the sooner the manufacturers of water tube boilers clearly set this before their patrons and give them to understand that it requires an intelligent man to get good results from their boilers, the sooner will the dissatisfaction, now so prevalent in the fire room of a plant with this type of boiler, be a thing of the past.

The heating contractor comes in for a share of interest in the kind of boiler to be used in the plant on which he is estimating. The price, the space occupied, height, location of drains, outlet, steam and feed nozzles, etc., all have a bearing on the kind of fixtures to be used, providing they are not mentioned in the specification, and their arrangement and equipment with pipe, valves, etc., necessary for their proper operation. When a water tube boiler is installed in a plant it should be particularly adapted to the work required. If it is not, it is impossible to get satisfactory results. I can only note this here, as it would be out of place to discuss the adaptability of the water tube boiler to the various kinds of work, but will say that the essential features of a good water tube boiler are as follows: A steam drum removed from the direct action of the fire, tubes inclined sufficiently to induce circulation in one direction; a mud drum removed from direct contact with the fire or gases of high temperature, and so located that any solid matter contained in the water may readily find its way into it and settle there without the possibility of again being forced into the circulating currents; a furnace and combustion chamber so proportioned to the heating surfaces that good combusion of the fuel and proper absorption of the heat may be obtained.

To say that the majority of water tube boilers on the market fill the above requirements would be a statement wide of the truth, and decidedly unjust to the firms that do build boilers with the component parts located as mentioned, and in which combustion, absorption of heat, and positive circulation of the water are obtained in a natural manner.

New Arena Building at Brandon, Man.

This structure will seat 6,000 and enclose the finest Horse Ring on the Continent.



The steam engineering features of a modern power and heating plant are numerous and complicated, and the man writing a specification covering this kind of work should be thoroughly familiar with it in all its details.

A few things mentioned in this article are merely suggestive and not meant to cover the whole field, but simply to call attention to a few very common defects in the method of preparing specifications, and incidentally to show a system of piping for using exhaust steam and reheating the water of condensation a part of the time, and low pressure live steam with gravity returns to the boiler when the engines are out of service.—Engineering Review.

In a recent test of a theatre in Colorado Springs, Col., to determine its ability to meet the city building requirements, the seats were filled with bags of cement and sand to represent the load due to the audience. The gallery and balcony are built of reinforced concrete, with no supporting posts, and the former was loaded with 768 sacks of sand, weighing 100 lbs. each, while two sacks were placed on each seat and four sacks on each step of the four aisles. The balcony was loaded with 1,124 sacks similarly distributed. The city engineer took levels with a Berger level and self reading rod, graduated in hundredths of a foot, and the maximum variation was only 0.05 ft. Next day levels were run over the same points with the aid of the same level and rod, the elevations being taken from a bench mark outside the building, and a maximum deflection of 0.01 ft. was observed. After the sacks had been removed, another series of levels gave results which were identical with those obtained in the first instance.

Bulletin No. 49 of the University of Illinois contains an account of tests on nickel steel riveted joints carried out by Messrs. A. N. Talbot and H. F. Moore at the University Engineering Experimental Station. A total of 90 nickel-steel and 54 chrome-nickel-steel joints were tested in tension, 16 nickel-steel and 16 chrome-nickel-steel joints were tested in tension, compression, and alternate tension and compression. Stretch, slip, and set of riveted joints were observed, as well as the bending of the rivets. There was a noticeable slip of joint generally at loads within the ordinary working shearing stress of the rivet. The movement of the joint increased fairly regularly to a load averaging about 35,000 lb. per square inch of rivet shear for the nickel-steel joints, when a marked increase of movement was found. This increase was closely coincident with a marked set of the joint and with a marked bending of the rivet. All the riveted joints failed by shear of the rivets, at ultimate shearing stresses, which ran fairly uniformly in both the nickel-steel and the chrome-nickel-steel series for all the types of joint tested.

New Building Regulations

The Superintendents of Buildings of the several boroughs constituting Greater New York adopted in January the following rules governing the use of hollow tile building blocks; the top floor partitions in fireproof buildings and the use of lime in cement mortar:

Hollow Tile Building Blocks

Hollow tile building blocks may be used for buildings not more than 35 feet in height under the following conditions: Hollow tile blocks shall be true and square and be of uniform shape and thickness when laid in courses.

No such blocks shall be used until complete and satisfactory tests have been made by the manufacturer under the direction of the Superintendent of Buildings and until an approval for the use of such blocks has been obtained.

No blocks shall be approved that do not develop a compressive strength of at least 2,000 pounds per square inch of net section. In no case shall hollow spaces of any such blocks exceed 50 per cent. The thickness of walls or webs of such blocks shall not be less than 1 inch.

The thickness of walls for any building where hollow tile blocks are used shall not be less than is required by the Building Code for brick walls. All such walls shall be laid in Portland cement mortar. All outside walls below grade must be filled in solid with Portland cement concrete.

No wall composed of hollow tile blocks shall be loaded in excess of 100 pounds per square inch of the gross section of the wall; i.e., no deduction being made for hollow spaces in figuring area.

Where wood beams or girders rest on such walls suitable templates of either iron, continuous tile, or stone shall be provided under their ends, or the blocks under them shall be solid.

Hollow tile lintels spanning an opening over 3 feet 6 inches wide shall be reinforced with cement and steel bars.

All walls of hollow tile blocks and beams used in same must be anchored in accordance with Sections 41 and 60 of the Building Code.

No walls constructed of hollow terra cotta blocks shall be broken to receive pipes, but must be recessed when molded.

Every block must have stamped thereon the name of the manufacturer or manufacturer's work.

Top Floor Partitions in Fireproof Buildings

In fireproof buildings where the roof beams are sloped and there is a hung ceiling in the top storey, the fireproof partitions, except those inclosing stair halls or elevators, in the top storey need not be carried higher than the hung ceiling. This applies to the top storey of the building only, it being understood that a so-called pent house, if used for other purposes than the inclosure of elevator machinery, tanks or forming bulkhead of stairs, is considered a storey of the building.

Lime in Cement Mortar

The use of lime putty or hydrated lime in cement mortar to the extent of not more than 10 per cent. is permitted in any case where cement mortar is required by a building permit or by the Building Code unless the approved application or any amendment thereto calls for pure cement mortar, and provided that no lime of any kind shall be used in cement mortar for foundations or foundation walls.

The city of Halifax, N.S., is entering upon one of the best building seasons in years. Much of the activity promised is due to recent large fires. Of the most important building projects may be mentioned the reconstruction of the King Edward Hotel, which will be carried out largely in concrete. The fire on Barrington and Granville streets will necessitate the reconstruction of a number of buildings. The Halifax Herald have obtained plans for a seven-storey plant and a building of similar dimensions will be erected by Messrs. Cragg Bros. The Barrington street fire in general will mean the expenditure of some $200,000. At the south end of the same block Messrs. Clayton will erect a new building. Another project is the re-building of the Woodside Refinery. A great deal of other construction work is under way and in prospect. It is expected that Dalhousie University will commence the erection of new buildings before very long.

G. T. P. in British Columbia

Sub-contracts for the construction of the main line of the Grand Trunk Pacific Railway from Aldermere, B.C., in Bulkeley Valley, eastward to Burns Lake, near Fraser Lake, covering an important section of Central British Columbia, have just been awarded by Messrs. Foley, Welch & Stewart, general contractors, as follows: Aldermere east, John Bostrom, 8 miles; Freeburg & Stone, 10 miles; Hugh McLeod, 4 miles; Sheady & Smith, 17 miles; John Albi, 10 miles; Bulkeley Summit westward, Duncan Ross, 10 miles; Bulkeley Summit eastward, John McLeod, 5 miles; A. L. McHugh, 10 miles; Dan Stewart, 10 miles; D. A. Rankin & Co., 14 miles along Burns Lake and eastward.

Sub-contractors working from Yellowhead Pass have also been given contracts for all the work westward to Fraser Lake west of Fort George, and the last spike will probably be driven in that vicinity. Some of the work on the western section, notably that of Mr. Dan Stewart, will be very heavy. The uncompleted gap of 415 miles separating Tete Jaune Cache from Aldermere will be the scene of great activity this year, as the grading from Hazleton to Aldermere is far advanced towards completion.

Railroad Contracts and Progress

Mr. John Timothy, Edmonton, Alberta, has been awarded a contract for building 25 miles of line for the Canadian Pacific from Sterling at the west end of the Weyburn extension.

Messrs. Foley Bros., Welch & Stewart, St. Paul, Minn., have sublet the work of constructing the Weyburn-Wellbridge extension of the Canadian Pacific Railway to Messrs. Ed. Peterson, Omaha, Neb. This work covers about 100 miles of line.

Some alterations have been made in the plans of the Canadian Northern tunnel into Montreal. The proposed tunnel will pass 20 feet under the cemeteries. The station will be on the site of the Turkish Bath Hotel, and will be partly underground. The C. P. R. tracks are to be crossed by a subway.

Messrs. M. P. and J. T. Davis, Quebec, Que., are reported to have been awarded a contract to build 70 miles of branch for the Government Nova Scotia Railway, from Dartmault east to Doan's Settlement. Messrs. Cavichi & Paganno, Halifax, N.S., have been awarded a sub-contract on this work.

Mr. W. A. Dutton, Winnipeg, Man., has obtained the contract by the Canadian Pacific Railway for constructing 85 miles of grade for the extension of its line northwest from Swift Current, Sask. Mr. Dutton has also been awarded the contract for double-tracking the main line of the Canadian Pacific, between Regina and Chaplin, a distance of 70 miles.

The Great Northern Railroad Company will start work in April, it is reported, on the terminal work at Vancouver, B.C. The work, which must be completed within 5 years, includes a passenger station, estimated to cost $500,000, a roundhouse and other buildings to cost $25,000. About $5,000,000 will be spent for the entire improvement of the terminals. Mr. A. Stewart, Seattle, Wash., is assistant chief engineer of the road.

Officials of the Canadian Northern Railway have been in conference with the city officials of Montreal, Que., regarding the tunnel plans of the railroad for that city. Detailed plans have been prepared by the Canadian Northern and it is hoped to settle all legal preliminaries so that work can be started this month. In connection with the tunnel scheme the Canadian Northern has started surveys to locate a route for a line between St. Eustache and St. Jerome, from which latter point the C. N. has a line running through the Laurentians past Sixteen Island Lake to Huberdeau.

Plans and specifications for the new C. P. R. office building at Edmonton, are in the hands of the Edmonton passenger agent, so that prospective contractors may view them. The building will be six storeys high and so constructed that an additional two storeys may be added as occasion requires. Contractors are to be asked to include estimates for these two storeys in their tenders. The street front on the ground floor, which is double height, will consist of large windows separated by pillars of stone capped by modelled heads of terra cotta. Over each window will be a carved panel representing some branch of agriculture or other pursuit of the country. The upper windows will be encased in chipped stone, while the side pairs will be framed in terra cotta in ornamental patterns. The remainder of the outside will be in red brick. The whole will be topped with an ornamental cornice, over which will be a balustrade.

The Canadian Northern system will have ten thousand men at work on the line from Port Arthur to Sudbury by the first of July next, and the Mackenzie and Mann interest will have in all over fifteen thousand men rushing their eastern lines to completion during the coming summer. This is the statement of Mr. W. H. Grant, manager of construction east of Port Arthur. The desire of the company is to have this important link completed by the time the mountain section is finished and thus secure a completed Canadian Northern main line from the St. Lawrence to the Pacific at Prince Rupert at the mouth of the Skeena in two years' time.

Mr. H. T. Hazen, Chief Engineer of the Duluth, Winnipeg & Pacific Railroad, who is in charge of one district on the construction of the Canadian Northern east of Port Arthur, embracing 285 miles, says that the work of construction on the Canadian Northern, eastward from Port Arthur, is progressing as favorably as could be expected. There are 2,500 men engaged at the work in his district. The Canadian Northern is being constructed through a sparsely-settled region, north of Lake Superior. There are places where it is necessary to carry supplies 60 miles or more. This is a territory which many think will yield mineral. The road will open up at least one known iron ore district.

Mr. E. F. Powers, of Messrs. Powers & Brewer, Grand Falls, N.B., was in Fredericton last week. Speaking of his firm's operations, Mr. Powers said that in the near future work would be commenced on a contract for replacing a number of bridges on the Dominion Atlantic Railway in Nova Scotia with modern steel structures. The Canadian Pacific Railway Company took over this road some time ago, and are now engaged in having it brought up to the C.P.R. standard. While Messrs. Powers & Brewer have already started work on their contract it will probably be April 1st when they commence placing a large force of men on the work. They will employ about 200 men on this work throughout the summer, their contract calling for an expenditure of between $175,000 and $200,000.

Mr. J. W. Hargrave, of J. G. Hargrave & Co., Ltd., Winnipeg, Man., advises us that his company has been awarded a contract for the construction of 30 miles of roadbed for the Canadian Pacific Railway from Suffield to a point 30 miles southwesterly. The completion of this line will necessitate the handling of approximately 700,000 cu. yds. of earth. There will be a large force required for this work. Mr. Hargrave intends to sub-let a portion of the grading. The material will be free to handle, and there will be no heavy machinery required in this work, as it is prairie fill. A portion of the grade runs along about 3 ft. above the level, and makes good side work. The balance is good machine work. This construction will commence as soon as the weather conditions will permit. The Hargrave Co., Ltd., has some construction work to complete from Bassano north, and when through there will move their entire construction crew to Suffield. Their head office is at Winnipeg.

An Interesting Announcement

A new Montreal company to deal in general agency business has just been incorporated at Ottawa with a capital of fifty thousand dollars under the name of Stuart, Drinkwater & Hingston, Limited.

This firm will represent for Canada The Brush Electrical Engineering Company, Limited, dealing in their complete line of electrical machinery, electric rolling stock, and electric supplies. In addition they will represent Messrs. A. W. Penrose & Company, of London, manufacturers of the Penrose electric elevators. The company will take over the Canada Ford Company, Limited, of which Mr. Stuart is President; Mr. Drinkwater, Vice-President, and Mr. Hingston, Secretary-Treasurer,—these three gentlemen constituting the sole shareholders of the companies.

Mr. Stuart, the President of the company, commenced his business career with the Bell Telephone Company of Canada, where he occupied the position of assistant purchasing agent until the Bell Telephone Company disposed of their plant to the Manitoba Government, when Mr. Stuart went west to conclude the arrangements. Almost immediately after his return to the east, Mr. Stuart entered into partnership with Mr. Ford and Mr. Drinkwater under the name of the Canada Ford Company, Mr. Hingston later joining the firm. In September last, Mr. Stuart, Mr. Drinkwater, and Mr. Hingston acquired the entire interests of Mr. Ford, who retired from the business. The company has met with considerable success in the last few months, and it is understood that the purpose of the new incorporation is really to grant the Canada Ford Company wider powers and identify the business more closely with the present active heads.

Mr. Drinkwater started his business life with Allis-Chalmers-Bullock, Limited, leaving them to join The Canadian Fairbanks Company, whom he left to enter into partnership with Mr. Stuart.

Mr. Hingston's entire business career has been with The Canada Ford Company. He is a son of the late Hon. Sir William Hingston, of Montreal.

One of the German technical papers records the fact that in a municipal electric power plant in the south of Germany is posted the following notice: "To touch these wires means instant death. Anyone failing to respect this warning will be prosecuted and fined." The penalty seems a little inadequate for culpable homicide. At least something with boiling oil in it should be added.

Personal News and Notes

During 1911 more than 300 miles of railway construction was carried out in the province of British Columbia.

Mr. W. F. Tye, of Toronto, President of the Canadian Society of Civil Engineers, has left Canada for a prolonged visit to Europe.

The city of Victoria, B.C., is breaking all previous building records. The total for the year to date amounts to nearly two million dollars.

Mr. D. Turcot, father of Ald. Turcot, and at one time a partner in the contracting firm of Prenoveou, Turcot & Martineau, died last week in Montreal.

Mr. John Haddin, Chief Engineer John Galt Engineering Company, Winnipeg, is taking an extended business trip in Western Canada in the interests of his firm.

Contracts have been awarded for the excavations for the dry dock terminals and hotel which the Grand Trunk Pacific will build at Prince Rupert at an estimated total cost of $5,000,000.

At Vancouver, operations are well advanced upon the 10-storey building for the National Finance Company. The building has a frontage of 49 feet on Cordova street and 47 feet on Hastings street. Reinforced concrete is used throughout.

Mr. Mieville, Resident Engineer of Messrs. W. H. Allen Son & Company, of Bedford, Eng. (who are represented in Canada by Messrs. Chapman & Walker, of Toronto), has just left on an extensive tour of the West and will call at all the leading towns en route.

An idea of the amount of residential work now being carried out in Toronto may be obtained from the fact that in 1911, according to the classified report of City Architect McCallum, no less than 5,437 dwelling houses were erected at a cost of twelve and a half million dollars.

An immediate start is to be made in the city of Winnipeg in extending its artesian well system in the Poplar Springs district. This district, it is stated, will supply at least an extra twenty million gallons of water a day. The work will be completed within two years and will cost $1,405,000.

At Calgary, Alta., the City Engineer, Mr. J. T. Child, is preparing estimates for bridge work to be carried out this season which will involve an expenditure of $829,200. The largest item is the proposed high level bridge on Centre street, which will be a reinforced concrete structure costing about $300,000.

The construction of the Granby Consolidated Mining & Smelting Company's plant will be commenced early in the spring at Goose Bay, Observatory Inlet, according to a report from Vancouver. Apart from the development and equipment of the mine the plant involves an expenditure of from $1,000,000 to $1,250,000.

The architects appointed to prepare conditions for the competition for designs for the Central Technical School building at Toronto are Messrs. Frank Wickson, of Toronto, and Percy E. Nobbs, of Montreal. For their services they will be paid one fifth, conjointly, of one per cent. of the estimate of the cost of the plans adopted.

An expenditure of $400,000 will be made this year in connection with road work by the county of Welland and the Provincial Government of Ontario. Preparations are being made for the construction of 185 miles of water-bound macadam road. Particulars may be obtained from the County Clerk, Mr. R. Cooper, Welland, Ont.

Owing to the scheme of the C. N. R. to build terminals on Dorchester street, Montreal, the Sun Life Assurance Company has decided to stay proceedings in the matter of building its new offices. As soon as the railway company's intentions are definitely settled, the Sun Life will give instructions for the necessary changes to be made in its plans, and will start work in the fall.

News has been received in Montreal of the death in England of Mr. Frederick Waite, for several years secretary of the Missisquoi Marble Company, Phillipsburg, P. Q. Mr. Waite had been in ill-health for some time, and about three months ago left for England hoping that the change would be beneficial. Gradually, however, he became worse. He is buried in Newport, Monmouthshire.

Mr. Charles H. Godfrey, vice-president and secretary-treasurer of the Montreal Steel Works, Limited, has accepted nomination by the Citizens' Association as candidate for Controller of Montreal in place of Mr. F. L. Wanklyn, who has retired. The latter gentleman has accepted a position with the C. P. R. He is general executive assistant "with such duties as the president may assign to him."

For the month of February, the Montreal building permits totalled 132, of the value of $467,220. This record is made up of 90 permits for new buildings, estimated to cost $389,705, and 42 permits for alterations, estimated to cost $77,155. In February last year the totals were 140 permits, and $642,428. From January 1st to February 29th of this year 201 permits were issued, the value being $739,710, as against 216 permits and $1,008,268 in the corresponding period last year.

In the February 28 issue of the Contract Record (page 59) it was erroneously stated that a new building would be built for the new headquarters of the Canadian Society of Civil Engineers and that Messrs. Saxe & Archibald were preparing plans. The project was confused by a local reporter with the proposed addition to the Engineers' Club building, at 9 Beaver Hall Square, Montreal, tenders for which will be called shortly and for which Messrs. Saxe & Archibald are the architects.

The annual convention of the Provincial Builders' Association of Alberta will be held at Lethbridge on March 16. It is expected that between 50 and 60 members of the Edmonton, Calgary, Medicine Hat and other Exchanges will be in attendance. The entertainment committee at Lethbridge consists of Messrs. A. H. McKeown, E. A. Cunningham, Geo. C. Wanless and Wm. Watts. Great preparations are being made for the entertainment of the visitors and the business sessions will be terminated by a banquet.

The contract for supplying the metal casements for the new eighteen-storey of the Canadian Pacific Railway Office Building at the corner of King and Yonge Streets, Toronto (Messrs. Darling & Pearson, Architects) has just been awarded to Steel and Radiation, Limited, of that city. The contract calls for Crittall Metal Casements as manufactured by the Crittall Manufacturing Company, of Braintree, England, and is one of the largest contracts for this style of window ever closed on this continent. The contract was closed in the face of keen competition.

On Monday, March 4, Mr. John S. Metcalf, president of the John S. Metcalf Company, Limited, Montreal and Chicago, died at his residence in Evanston, Ill., after about a year's illness. Mr. Metcalf was born near Sherbrooke, P.Q., in 1847, but at an early age left this country for the United States. In recent years, however, he has spent much of his time in Canada. Heart trouble was the cause of death. Mr. Metcalf devoted his life to the design and construction of large grain elevators, and was universally recognized as having attained the leading position in his profession. Many of the largest terminal elevators of Canada are his work, examples including the Grand Trunk elevator at Windmill Point, the Harbor Commissioners' conveyor system, and the Harbor Commissioners' elevator

No. 2, now under construction, all in Montreal. He leaves a wife and three daughters.

The Quebec Government has given out further details of the proposed scheme for constructing additional roads, the following being the conditional programme. Two roads from Montreal to Rouses Point, one via Laprairie, the other via Chambly and St. Johns; two roads from Montreal to Quebec, one on the north and one on the south shore of the St. Lawrence; from Montreal to Sherbrooke; from Montreal to the Ontario frontier at Hull; from Quebec to Rimouski; from Quebec to Richmond; from Three Rivers to Grandes Piles, via Shawinigan and Grand Mere; from Sherbrooke to the United States frontier, making in all a distance of about 1,200 miles. In addition to these routes the money will also be at the disposal of the municipalities who want to improve their ordinary roads, on the condition that the municipalities pay a half of the loan interest. With the ten millions proposed to be raised, 1,650 miles of macadamized roads can be built for $5,000,000, and 16,000 miles of gravelled roads can be constructed for the other $5,000,000. All the subsidized roads will be built under the supervision of Government engineers.

Publications Received

General Catalogue No. 11 of the Luitwieler Pumping Engine Company, manufacturers of the Luitwieler system of non-pulsating pumping machinery, contains full information regarding the principles and operation of the products of the firm. It also describes and discusses other methods of pumping and makes comparisons, illustrated by figures and diagrams, showing the advantages of this make for general and specific uses. Complete data is given upon the company's entire line of pumping engines and their various applications. Copies may be obtained upon application to the company at 123 Ames street, Rochester, N.Y.

The Trussed Concrete Steel Company has brought out the fourth addition of its valuable and instructive booklet relating to Rib Lath and Rib Studs for plaster and stucco in sidings, partitions and ceilings, furring hollow walls and hollow partitions. The introductory matter consists of comments intended especially for the attention of builders, and following these are descriptive particulars relating to the forms of construction above referred to. There are specifications for cement stucco and for metal lath, with detail sketches showing Hy-Rib on the outside and Rib Lath on the inside walls of residences. There is also considerable about "overcoated" houses, a subject that is of timely interest in these days. The bulk of the illustrations are halftone engravings showing buildings in connection with which the company's product has been used.

We have received from the publishers, Messrs. David Williams Company, New York City, a copy of an interesting book, entitled "Engineering as a Vocation," by Mr. Ernest McCullough. In a prefatory note the author states that this book is published "for the information of parents in order that they may act wisely in selecting a career for their sons." Mr. McCullough deplores the number of students who are pursuing courses in technical schools as a result of advice received from semi-technical periodicals and daily newspapers. While we are inclined to think that Mr. McCullough is somewhat pessimistic in his utterances, we cannot but concede that the book he has written is far more valuable and certainly better balanced than any previous dissertation upon this subject that we have read. An idea of the nature of the contents of this book may be obtained, perhaps, from the titles of the various chapters, which include the following: The Work of the Engineer; The Education of the Engineer; How to Hunt and Hold a Job; Does it Pay to Study Engineering? The book is bound in cloth, contains 201 pages and four illustrations and is sold for $1.00 net.

We have received from Messrs. F. H. Hopkins & Company, Montreal, Canadian representatives of the Marion Steam Shovel Company, Marion, Ohio, an interesting catalogue setting forth the merits in manufacture and operation of the Model 28 Marion Steam Shovel. The Model 28 is deservedly popular on account of its wide range of utility, efficiency of service and low cost in operation. It can be operated entirely by one man. The shovel is equipped with a ⅝ cubic yard capacity dipper and the total weight of the shovel complete in working order is only seventeen tons. The manufacturers claim that it will handle at a splendid profit work having cuts as shallow as ten inches in depth, and in actual test it has developed ample propelling and swinging power to operate safely and successfully on a 15 to 20 per cent. grade. Under fair conditions it will average 25 to 50 cubic yards an hour. The company manufacture special revolving shovels for stripping over-burden, such as coal, iron ore, stone, phosphate rock, and other similar material. These shovels are exceedingly powerful and are the largest of the kind ever built. In their design special provision has been made to successfully withstand the severe shocks and strains incidental to the strenuous conditions under which they must operate. They are provided with unusually long booms for making wide cuts and dumping the excavated over-burden far enough to one side so that the material thus uncovered may be mined out without being partly under the spoil bank. By a single operation these shovels take the over-burden from the bank on one side and deposit it far enough over on the other to eliminate the extra expense of rehandling necessary by other methods, thus reducing the labor required to the shovel crew. A large number of these shovels are in operation and are giving the best satisfaction.

Trade Inquiries

The Dominion Government Trade and Commerce reports contain the following enquiries. Readers of the Contract Record may obtain the names of enquirers by writing to the Department of Trade and Commerce, Ottawa.

217. **Patent system of heating.**—A Scottish correspondent desires to arrange for the sale of the Canadian patent rights in a system of cold-resisting and heat-conserving applicable to hot pipes (air, steam or water), etc.

218. **Iron and steel goods.**—A Glasgow correspondent dealing in iron and steel goods of various kinds desires to do Canadian business.

223. **Machine belting.**—A Welsh company manufacturing patent solid woven machine belting wishes to get into touch with Canadian engineering firms who can introduce this line.

237. **Wall paper.**—A manufacturer's agent in Buenos Ayres desires to be placed in touch with exporters of wall paper. Further particulars as to terms and conditions, etc., may be obtained on application to the Department of Trade and Commerce.

253. **Machinery.**—A Glasgow firm of consulting, inspecting and contracting engineers desires to get into touch with Canadian importers of machinery requiring such services as they can render.

256. **Mechanical and electrical engineering goods.**—A Birmingham firm of mechanical and electrical engineers manufacturing steam, air and electrically driven hauling and winding gears and three throw pumps, electric capstans, etc., wishes to be placed in communication with Canadian importers.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Calgary, Alta.
Engineer, J. T. Child, City Hall, is planning the construction of a storm water sewer to cost $360,000.

Fort William, Ont.
Tenders for 18-in. cast iron water mains will shortly be received by City Engineer. Cost $45,000.

Greenfield Park, Que.
The municipality will issue debentures for $23,500 to be expended on sidewalks, pavements, macadam roads, drains, etc.

McKenzie Hollow Embankment, St. Marys, York County, N.B.
Tenders are called until April 3rd for pipe culvert. Owner, Provincial Government. Secretary, H. M. Blair, Fredericton, N.B. Plans and specifications at this office.

Niagara Falls, Que.
Tenders are called until April 1st for pavement, cost $175,000. Mayor, C. C. Cole; clerk, W. J. Seymour; city engineer, J. C. Gardiner. Wire cut, vitrified block, Westrumite, concrete, asphalt block and bitulithic are approved. Tenderers to submit specifications.

Ottawa, Ont.
The Board of Control will interview Minister of Public Works in regard to opening O'Connor street from Lewis to McLeod streets. Government to bear half cost. Estimated cost $32,000..

Pokiok Embankment, Brighton Parish, Car County, N.B.
Tenders are called until March 25th for pipe culvert. Plans and specifications at office of secretary, H. M. Blair, Fredericton, N.B.

Princeton, B.C.
British Columbia Government. Engineer, Parkinson, will start programme of roadmaking, grading, widening and bridge building in vicinity of Princetown early in the spring. Cost 8,000.

Saskotoon, Sask.
Tenders will be received by commissioners until March 29th for construction of 13 miles of sanitary sewer and water main and construction of necessary manholes, flush tank and setting of fire hydrants and gate valves, etc., as shown on plans and profiles and shown on specifications; and also for laying of 8990 lineal feet of storm sewers and appurtenances. Plans and specifications at office of engineer. Engineer, Geo. T. Clark. Commissioners, Jas. Clinkskill, W. B. Neil and E. M. Snell, Saskatoon.

St. Catharines, Ont.
Tenders will be called shortly for bitulithic pavements on several streets. Mayor, Dr. W. H. Merritt; engineer, Brown.

Toronto, Ont.
The city council has given notice of its intention to construct sewers, concrete curbings, pavements and concrete sidewalks on several streets as per plans etc. at City Engineer's office.

Vancouver, B.C.
Tenders are called until March 15th for construction of 5 ft. 6 in. dia. brick and concrete sewer, 12th avenue, Bridget to Heather street; 5 ft. 0 in. dia. brick and concrete sewer, 12th avenue, Heather to Willow street. City Clerk, Wm. McQueen. City Engineer, F. L. Fellowes.

Tenders are called until March 19th for construction of trunk sewer, Balaclava street, 2,350 ft. horse-shoe shape and 10 ft. 4 in. x 8 ft. 4 in. Plans at City Engineer's office. Wm. McQueen, Clerk. City Engineer, F. Fellowes.

Welland, Ont.
Tenders will be received by Chairman until March 18, 1912, for 37,000 square yards of pavements in vitrified brick, bitulithic, asphalt block or granitoid. Plans and particulars at office of engineer. Town Clerk, George R. Boyd, Chairman, Geo. H. Burgar.

Preparations are being made for road making to cost $400,000, for County of Welland and Provincial Government. County Clerk, R. Cooper, Welland. Warden, John Hill, Wainfleet, Ont. 125 miles of roads to be built. To be water bound macadam road 10 ft. wide. Work to be done on Force account.

Winnipeg, Man.
Tenders are called until May 1st for asphalt pavement, Portage avenue. Secretary Board of Control, M. Peterson. City Engineer, H. H. Ruttan, 223 James avenue, Winnipeg.

CONTRACTS AWARDED

Hamilton, Ont.
Contract is awarded for sewers on Primrose avenue and Bellevue ave., at $1.90 per foot. Mayor, George H. Lees. Engineer, A. F. Macallum.

Hull, Que.
Contract for Clothildia and Columbia street sewers has been awarded to Wilson & Couture, Hull, $4,461. Contract for Brewery street and Chelsea street sewers awarded to Bissien & Carrien, Hull, $10,870. City Engineer, J. Albert LaForest.

Winnipeg, Man.
The following contracts for sewers were awarded to Engineer of Construction: Eaton street, $712.50; Redwood avenue, $1,650; Alfred avenue, $632.25; Morley avenue, $909; College avenue, $899.40; Herbert avenue, $2,394.70; Wesley avenue, $1,035; Chalmers avenue, $1,634. Thos. Jacks & Son, Winnipeg, was awarded Jasper avenue sewer at $1,764.75. Engineer, N. F. Ruttan.

Railroads, Bridges and Wharves

Calgary, Alta.
Plans have been prepared and estimates made for following bridges: Bridge across Bow River at Fourth street west, $210,000; bridge across Bow river at Fourteenth street west, $162,750; bridge across Elbow River at 4th street west, $81,900; bridge across Bow River at present Louise Bridge, $74,550. Final estimate for Centre street bridge not yet prepared but cost will be about $300,000.

Coquitlam, B.C.
Canadian Pacific Railway Co., Gen. Manager Western lines, George Bury, Winnipeg, will commence active construction upon railway terminals and shops to cost $600,000.

Hamilton, Ont.
The steelwork is going up for bridge extensions to cost $250,000, for Hamilton Bridge Works Co., Hamilton. President, Hon. John Hendrie, Hamilton. Designer, R. K. Palmer, c/o Company. Two buildings 260 x 65 and one 80 x 150. Steel and concrete construction. Firm does steel work. Other contracts to be let.

Kingston, Ont.
Tenders are called for railroad equipment; 3060 tons of No. 65 steel rails, for Kingston & Pembroke Railway Co. Superintendent, F. Conway, Kingston.

Lake Nipigon, Ont.
Canadian Northern Railway Co., Toronto, are open for tenders for railway construction. Sub-contractor, R. K. Russell, Traders Bank Building, Toronto. Tenders will be received privately for 3,000 yards of concrete by R. K. Russell; 3 arch culverts 12 ft. diameter; 3 piers for bridge over Nelson River.

Lorneville, N.B.
Tenders will be received by secretary until April 1st for construction of extension to breakwater at Reed's Point. Plans and specifications at engineer's office. Dept. of Public Works. Secretary, R. C. Desrochers, Ottawa. District Engineers, E. T. P. Shewen, St. John, N.B., Geoffrey Stead, Chatham, N. B.

Ottawa, Ont.
The Ottawa Street Railway Co., Ottawa. Engineer, J. E. Hutchison, will make the following extensions this year. Ottawa South Loop, estimated sost $26,000; Preston St. loop, estimated cost $37,000. If Government consent is obtained, Railway will also run line on Wellington street, cost $32,000.

Port Colborne, Ont.
A by-law to grant fixed assessment to the G. T. R. Co., Montreal, for the erection of station and freight sheds, will be submitted March 27th. Town Clerk, F. D. Noble.

St. Catharines, Ont.

Revised estimates have been prepared for high level bridge, cost $158,180, King street, over Canal. Engineer's estimate calls for high level bridge 30 feet wide, with 5-foot cantilevered walk; total width between hand rails 35 feet. Approaches, embankments, reinforced concrete roadbed and surfacing, two retaining abutment walls with wing walks, substructure and superstructure complete, designed according to "Dominion Soo" specifications. Mayor, Dr. W. H. Merritt. City Engineer, Brown.

Stone Ridge, York Co., N.B.

Tenders are called for bridge. Owner, Provincial Government. Secretary, H. M. Blair, Fredericton, N.B. Received by secretary until March 18th, 1912. Specifications and plans at office of secretary.

Toronto, Ont.

Engineer, E. L. Cousin is preparing plans and specifications for completion of Sunnyside sea wall. Boathouses and other buildings to be demolished. New range lights required.

Upham, King's Co., N.B.

Tenders are called until April 3rd for bridge. Specifications and plans at this office. Provincial Government, Secretary, H. M. Blair, Fredericton, N.B. ....

Vancouver, B.C.

Detail plans are in progress for bridge across 2nd Narrows, for Burrard Inlet Tunnel & Bridge Co., Vancouver, B.C. Representative, Sir John Wolf Barry, Vancouver. After approval of Commission is obtained tenders will be called.

Victoria, B.C.

Following are provincial estimates for bridges, schools, roads, etc.: Bridges, $1,026,000, including $400,000 for the Second Narrows bridge; works and buildings $3,140,500; new roads, $1,000,000; Provincial university $500,000; Normal school at Victoria $125,000; addition to the Vancouver court house, $265,000.

Welland, Ont.

It is proposed to construct a steel bridge over Waidlaw Creek by County Councils of Welland and Lincoln counties. County Clerk, Lincoln Johnson Clench, St. Catharines.

Weyburn, Sask.

General Manager Chamberlain, Winnipeg, has announced definitely that 2 lines of railroad will be built to Weyburn this year. 1. From Cedoux, 12 miles north of Weyburn to the International boundary. 2. From a point near Talmage to Weyburn and thence to Alberta.

Winnipeg, Man.

Plans are being prepared for bridge, Conway street. City Engineer, H. N. Ruttan, 223 James avenue, Winnipeg. Secretary Board of Control, M. Peterson. Tenders to be called shortly and will close May 1, 1912.

CONTRACTS AWARDED

Montreal, Que.

Concrete covering for river. Contract awarded to Haney, Quinlan & Robertson, Montreal, $75,500. 2200 ft. of Little St. Pierre River to be covered with concrete and sides shored by wooden planking.

Marble contract is awarded for railroad station annex for Canadian Pacific Railway Company, Montreal. Architect, F. E. Ellingwood, Windsor street office. General contractors, C. E. Deakin, 11 St. Sacrament street, Montreal. Subcontractor, C. Mariotti, Victoria Marble Works, 269 Ottawa street, Montreal. Missisquoi marble to be used.

Sub-contracts are awarded for railway, (Ottawa-Pembroke section). Owner, Canadian Northern Railway Co., Toronto and Montreal. General contractor, J. P. Mullarkey, Ltd., Coristine Bldg., Montreal. Sub-contracts as follows: P. J. Brennan, Ottawa, ten-mile section from Rideau Junction; Brennan & MacDonald, Arnprior & Smiths Falls, bridges over Ottawa River at Chats Falls and at Portage Du Fort; also grading of line between bridges, distance about 25 miles. Ross & McComb, 304 Prince Arthur street, Montreal, grading and concrete between miles 66 and 74, Munro & Moffat, Pembroke, Ont., mile 74 to Pembroke, grading and concrete work, McGregor Banwell Fence Co., Walkerville, Ont., fence work, Ottawa to Pembroke.

Winnipeg, Man.

Redwood bridge. Contract awarded to Holmes Bros., Winnipeg, to cost $13,156. City engineer, Col. H. N. Ruttan, 223 James avenue, Winnipeg.

Public Buildings, Churches, Schools, etc.

Arthur, Ont.

A site has been purchased for public library to cost $7,500; and town will make arrangements for erection of building with Carnegie Library Trustees. Secretary, T. E. Langford.

Buchanan, Sask.

The Buchanan School Board, secretary-treasurer, Albert Hermanson. plan to erect a new school; 2-storey, solid brick, basement, steam heating, wardrober, 2 class rooms and hall on 2nd floor. Cost $10,000.

Bridgeburg, Ont.

Tenders will be received by secretary. until April 30th, for cement, lumber, furniture, fittings, etc, required for new Knox Presbyterian Church. Secretary, A. S. Jackson, Bridgeburg.

Calgary, Alta.

Tenders are called until April 1st for Victoria School to cost $75,000, for Calgary School Board, Calgary. Architect, Mr. McLellan, City Hall. Two storeys, brick, concrete, concrete foundations, steam heating, electric lighting, slate roof, oak finish, 8 rooms and assembly hall, fireproof.

Orpheum Theatre Circuit Co., Chicago, Ill.; Manager, Mr. Beck, have purchased site and plans are being prepared for new theatre here. Address inquiries to manager of company, Chicago.

A permit has been applied for to erect a public hall to cost $10,000, 1st avenue west, for Ho Leno and other Chinese citizens of Calgary. Architect, Mr. Bennett, Calgary. Two-storey, 20 x 100, brick, concrete foundation, electric lighting, steam heating, Ruberoid roofing.

Canmore, Alta.

Plans are being prepared and tenders will be called for Hall for Miners Union. Architect, J. A. McDonald, Dominion Blk., Calgary. Concrete and frame construction.

Carp, Ont.

Church for Methodist Congregation. Architects, Horwood, Taylor & Horwood, 130 Sparks street, Ottawa. Brick, concrete foundation. Tenders received by architects until March 21, 1912. Separate tenders for concrete and remainder of building.

Drayton, Ont.

Tenders are called until March 15th for new St. Martin's Church. Architect, Geo. Gray, Harriston. Address Rev. Father Arnold.

Eastview, Ont. (near Ottawa)

Tenders have been called for school for Separate School Board. Chairman, Joseph Charette. Architect, Frank Sullivan, Sparks street, Ottawa.

Edmonton, Alta.

City solicitor Brown is instructed to prepare by-law to provide for expenditure of about $237,000 for construction of six-storey municipal building, 73 x 113, on Queen's avenue and extension of Elizabeth street.

Fredericton, N.B.

Tenders will be received by secretary until March 18th for interior fittings for Post Office Customs & Inland Revenue Building. Dept. of Public Works; Secretary, R. C. Desrochers, Ottawa.

Hamilton, Ont.

Plans have been prepared for theatre and stores, cor. Barton and Leeming sts. for Guest & Symons, 435 Barton street E., Hamilton. Architects, Stewart & Witton, Hamilton. Fire escapes required.

Plans are being prepared for Central Fire Station. Mayor, George H. Lees. City Engineer, A. F. Macallum. Architects, Stewart & Witton, 2 Hughson st. south. Architects are preparing plans and specifications.

Plans are being prepared for church to cost $20,000, for Hamilton Presbyterian Church Extension Society, Hamilton. Architect, Stewart McPhie, Bank of Hamilton Bldg.

High River, Alta.

Tenders are called until March 15th for school; 4-rooms, solid brick. Owner, High River School Board, High River. Secretary, Norman Young.

Hull, Que.

Work will be started at once on Hospital to cost $40,000, for Sisters of Providence, Montreal. City Clerk, John F. Boult. Agreement with city calls for erection of hospital by September. The owners have asked to have time extended.

Longue Point, Que.

The Board of Control recommended the erection of combined Police and Fire Station. Accommodation for steamer, extension ladder, hose wagon, firemen's quarters. Recreation hall and constables quarters. Cost $70,000.

MacLeod, Alta.

A by-law will be submitted in week or so for building to house police and fire departments, board of trade, and municipal offices. Secretary, Brown. Mayor, Stedman.

Montreal, Que.

Tenders will shortly be called for addition to Engineers Club Building, 9 Beaver Hall Square. Secretary, R. W. H. Smith, 9 Beaver Hall Square. Architect, Saxe & Archibald, 59 Beaver Hall

Hill, Montreal. Cut stone, concrete, steel frame, concrete foundation, electric and gas lighting, hot water heating, slate roof, (steel trussed) refrigerators and dumb waiter, new kitchen to be added in extension basement, dining room on first floor, billiard room on ground floor, oak panels in dining room, hardwood finish, new lavatories, lockers and stairway in old portion of building.

Plans are being prepared for Roman Catholic Church, Amherst street, between Ontario and Demontigny streets, for St. Catherines Parish. Architect, Venne & Labelle, 5 Beaver Hall Square, Montreal.

"L.Englise du Redempteur." French Anglican Congregation are contemplating the erection of a new church.

Amherst Park Congregational Church have purchased a site for the erection of a new church on Huntley street.

Moose Jaw, Sask.

Plans are prepared for Mission Home to cost $60,000, cor. Fairford and Eighth ave., for Apostolic Church of Moose Jaw. Representatives, J. W. Plater and J. A. Sanderson, M. J. Architect, Victor E. Spencer, Moose Jaw. Four storeys, 50 x 110, stone, stone foundation, lecture room 600 seating capacity, apartments, kitchen, plumbing, vacuum cleaning.

Nelson, B.C.

Plans have been prepared for fire hall to cost $18,000. City Engineer, G. C. Mackay. Stone, concrete, brick, concrete floor, fire apparatus. six stalls, lavatory, reading room, steam heating.

Ottawa, Ont.

A by-law will be submitted to raise $40,000 for addition to schools and completing new schools.

Plans have been prepared for race track and buildings, Connaught Park, Aylmer road, for Ottawa Racing Association. Chairman Finance Committee, Col. J. W. Woods, Ottawa; architect, W. H. George, Ottawa. Engineers, K. W. & J. E. Farley, Ottawa. Grandstand, 3,000 seating capacity with tea room and dining hall below. Stand single decker 400 feet long, 40 boxes. Track 65 feet at back and 65 feet on stretch. Club house two storeys, canopy top and verandah, mission furniture, jockey quarters to be modern and equipped with showers and lockers. Stables for 500 horses. New spur line to be built to track by Hull & Aylmer Electric Co.

Pincher Creek, Alta.

Plans are being prepared for municipal hall to cost $25,000. Clerk, G. D. Plunkett. Architect, J. A. McDonald, Dominion Block, Calgary. Brick and concrete construction.

Point Grey, B.C.

Competitive plans are invited for three schools for Point Grey School Board. Three new 8-room, brick schools, at Eburne, McGee and W. Shaughnessy Heights, also addition to Kerrisdale school. By-law to be submitted to ratepayers to provide $125,000.

Prince Albert, Sask.

Plans will be prepared for police station to cost $15,000, rear City Hall. Chief of Police, A. E. Danby, Prince Albert; 3-sty., concrete and brick, steam heating, concrete cells, police office, court room, bedrooms, recreation rooms

Regina, Sask.

The City of Regina, City Commissioner A. J. MacPherson, plans to erect 2 new brick fire halls. Cost $26,000.

Estimates have been prepared for Police Station to cost $40,000. City Commissioner, A. J. MacPherson, Regina. Station to be modern in design and equipment. New motor police patrol wagon will be purchased.

Revelstoke, B.C.

Munroe & Smythe of Star Theatre, plan to erect a new opera house. Building to be used for motion pictures and road shows. Concrete construction, colored glass, modern seating, electric lighting, automatic organ.

Shelburne, Ont.

Plans are prepared for church to cost $8,000, for Anglican Congregation. Committee, G. M. Vance, K.C.; H. White, Shelburne. Pastor, J. S. Adamson, Shelburne. Architect, Mr. Foster, Owen Sound. One storey and basement, stone front, brick walls, stone foundation, electric lighting, slate or shingle roof, steam or hot air heating, seating and chancel and furniture, plumbing and toilets, Cathedral glass.

St. Marys Indian Reserve

Tenders will be received until April 1st for erection of frame schoolhouse on St. Marys Indian Reserve. Department of Indian Affairs. Secretary, J. D. McLean, Ottawa. Indian Agent, N. J. Smith, Fredericton, N.B.

Sydney, N.S.

Plans are being prepared for skating rink to cost $15,000, Inglis street, for Messrs. A. N. McLennan, H. Grant, G. A. R. Rallings and P W. Publicover of Sydney. Architect, F. W. Spencer, Publicover Blk., Sydney, N.S. Tenders will be received shortly by A. N. McLennan, Sydney, N.S. Electric lighting system, gas engine and generators, wiring, switch board. etc. 1-sty., wood, 74 x 200, concrete piers.

Tilbury, Ont.

Plans will be prepared and site purchased for an early start in spring on the erection of a new town hall. Committee, Councillors Clark and Bene.

Toronto, Ont.

Plans are in progress for new institute, cost $30,000, Emily street, for St. Andrews Presbyterian Congregation, Toronto. Architect, Curry & Sparling, 90 Yonge street, Toronto. Tenders open shortly.

Vancouver, B.C.

Plans have been considered for new building for Young Men's Christian Association of Canada. Local architect, H. S. Griffiths, Dominion Trust Bldg., Vancouver. Work will commence shortly.

Plans are being prepared for school office building to cost $520,000, S.W. cor. Cordova and Cambie streets, for McConnell, Abbot & Drayton. Architects, Wellington & Wheatley, Davis Chambers, Vancouver. Four-storey, reinforced concrete building to be erected to contain stores on ground floor and offices on upper floors. It is understood that one floor will be occupied by N. A. Leech, school architect. Further details later.

Viauville, Que.

Tenders will be called for erection of a Roman Catholic Church for Parish of St. Clements. Architects, Venne & Labelle, 5 Beaver Hall Square. Montreal. Stone structure, concrete foundation, 52 x 208.

Victoria, B.C.

Site has been secured for Normal school, Mt. Tolmie rd. and Hillside ave., for Provincial Government. Secretary. H. E Young. Estimates provide $135,000; site comprises 7½ acres on which a manual training, normal school, etc., will be erected.

Welland, Ont.

An appropriation of $1500 for site has been made and property is secured for the erection of a new high school. Mayor, G. Sutherland.

Winnipeg, Man.

By-law will be submitted to raise funds for two new fire halls. Hall No. 14, cor. Westminster and Ruby streets. Hall No. 15, Logan avenue, near Imperial Oil Wks. Cost $75,000. Secretary Board of Control, M. Peterson .

Plans have been prepared for Civic team sheds to cost $25,000, Elmwood. City Engineer, Col. H. N. Ruttan, 223 James avenue, Winnipeg. Solid brick stable and carriage sheds to be erected in municipal yards.

Tenders will be called at once for school, for Brittania School Board. Architect, E. D. Tuttle, 701 McArthur Blk., Winnipeg. Solid brick, stone foundation, electric light, steam heating.

The Knox Presbyterian Church, Chairman, Sir Daniel H. McMillan, Winnipeg; secretary, H. H. Saunderson, 200 Balmoral street, plan to start work this year on a new stone church, cor. Edmonton street and Qu'Appelle ave.

CONTRACTS AWARDED

Athens, Ont.

Post Office to cost $15,000. Dept. of Public Works, Ottawa. Architect, Dept. of Public Works. General contractor, B. Dillon, Brockville. Two-storey, brk. and stone, stone foundation, electric and gas lighting, steam heating, slate roof, hardwood finish.

Haileybury, Ont.

Convent to cost $45,000, for Roman Catholic Church (Bishop E. A. Latulippe, Haileybury). Architect, Eugene Payette, 103 St. Francois Xavier street, Montreal. Contractor, V. Ladoncer, 107 Augusta street, Ottawa. Steel contractor, Structural Steel Co., Ltd., Longue Point, Que.

Megantic, Que.

Convent to cost $35,000 for Congregation of Notre Dame Roman Catholic Church, Megantic, Que. Architect, Jos. Sawyer, 407 Guy street, Montreal. General contractor, Goulet & Bonin, Megantic, Que. Three-storey and basement, 135 x 45, solid brick, masonry foundation, electric lighting, hot water heating, galvanized iron roof, steel frame, hardwood floors.

Montreal, Que.

Addition to convent to cost $9,000, Sherbrooke street, for Sisters of the Good Shepherd, Sherbrooke street, Montreal. Architect, Venne & Labelle, Beaver Hall Square. Montreal. Contractor, Theo. Lessard, 210 Park avenue. Cut stone construction, replacing old wooden structure.

Library to cost $150,000, St. Denis street, for St. Sulpician Fathers, St.

Denis street, Montreal. Architect, Eugene Payette, 108 St. Francois Xavier street, Montreal. Stonework, Cleveland Sandstone Co. Ltd., Montreal; masonry. M. Herberteau, 633 DeMontigny E.; steelwork, Structural Steel Co., Ltd., Longue Point, Que.

School rooms to cost $9,000, Christophe Colomb, for Amherst Park School Commissioners, c/o architect. Architect, L. R. Montbriant, 230 a St. Audre street. General contractor, Geo. Cote, 2031 Boyer street, Montreal. Brick, 180 x 60. To finish two upper storeys of school.

Theatre, cost $100,000, for Canadian Amusement Company, Orpheum Building. Architects, Ross & McFarlane, Beaver Hall Hill. General contractor, C. E. Deakin, 11 St. Sacrament street. Steelwork, Dominion Bridge Company, Lachine. Fireproof flooring, Kompolite Flooring Co., New York. Two storeys, 70 x 149, gas and electric lighting, tar and gravel roofing, fire escapes, steam boiler.

Niagara Falls, Ont.

School, cost $7,000, Barker street, for Niagara Falls Public School Board. Two storeys, brick, stone foundation, hot air heating, shingle roofing. Chairman, W. R. Price. Secretary, Geo. Mortimer. Contractor, W. S. Homan, Niagara Falls.

Truro, N.S.

The contract has been awarded to Rhodes Curry & Co., Ltd., Amherst, N.S., for the construction of a brick and stone civic building to cost $45,000. Leslie R. Fairn, architect, Aylesford, N.S. Horace McDougall, Town Clerk and Treasurer.

Weyburn, Sask.

Excavation is partly done for post office to cost $65,000, Souris avenue. Department of Public Works, Ottawa. General contractor, Navin Bros., Moose Jaw, Sask. Three-storey, 55 x 90, brick and stone, concrete foundation, hot water heating, galvanized iron, mansard roof, oak and fir interior finish, 3 vaults, boilers. Work held up after Federal Elections, to be resumed at once. Glazing, plumbing and heating not let yet.

Windsor, Ont.

Public school to cost $40,000. Secretary, Alex. Black. Architects, Jacques & Company, Windsor. Excavation and masonry, Thompson Bros., Windsor, $18,963; carpentry, Euclid Jacques, Windsor, $13,275; painting and glazing, Lassing & Harris, Windsor, $1,900; plumbing, Pennington & Brian, Windsor, $2,290; roofing, T. Blackburn, Windsor, $730.

Residences

Calgary, Alta.

Tenders have been called for five residences, cost $5,000 each, Rosedale ave., for Mr. McKay. Architect, Leo. Dowler. Two storeys, brick veneer, concrete foundation, electric lighting, hot water and hot air heating, shingle roofing.

Hamilton, Ont.

Plans will be prepared for three-sty. apartments to cost $25,000 on Barton st. between Victoria and East avenue, for Jos. Farrell and W. Goering, 330 John street south.

Tenders are called for residence to cost $10,000, for Ray Moodie. Architect, Stewart McPhie, Bank of Hamilton Bldg., Hamilton.

Tenders are called for residence, cost $18,000, Spruceside ave., for Col. W. H. Bruce, 133 George street. Architects, Stewart & Witton, 2 Hughson street S. Received by architect until March 23rd.

London, Ont.

Messrs. Watt and Blackwell, architects, are preparing plans for a new 2-storey brick and stucco residence for W. Fleming to cost $4,000. Interior equipment, electric lighting and steam heating apparatus will be required. Work will commence in the spring.

Montreal, Que.

Plans are being prepared for apartments, cor. Mance street and St. Joseph Boulevard, for F. H. Charbonneau, c/o of the architect, R. Charbonneau, 52 St. James street, Montreal. Three storeys and basement, 125 x 100, stone foundation, solid brick and stone trimmed superstructure, hot water heating, gas and electric lighting, hardwood finish, enamelled plumbing, gravel roof, hardwood.

Tenders will be called at once for 2 apartment houses, City Hall avenue and Dorchester street, for Mrs. Desauniers, Montreal, c/o architect. Architect, Alphonse Piche, 52 Victoria Square, Montreal. Two 7-suite apartment houses, steam heating.

Plans being prepared and tenders will be ready soon for two apartment houses. Architect, J. E. Adamson, cor. St. Catherine and Stanley streets, Montreal.

Plans are prepared for alterations to residence, 368 Mountain street, for Dr. F. T. Tooke, 368 Mountain street. Architects, MacVicar & Heriot, 104 Union avenue.

Plans are prepared for 2 residences to cost $16,000, Westmount Boulevard, for A. Racine, 340 St. Paul street. 2½-sty., brick, stone foundation, hot air heating, electric lighting, skylights, cut stone, mantles, tiles, hardwood floors and finish, plastic relief work, plate glass, tar and gravel roofing.

Omer Dansereae, 2546 Park avenue, Montreal, will start work in the spring on the erection of 6 flats on St. Urban street; 2-sty., 50 x 61, brick, concrete foundation, gravel roof. Cost $9,000.

Point Grey, B.C.

Plans are prepared for residence to cost $12,000, for W. F. Brougham. Architects, Honeyman & Curtis, 821 Pender street W., Vancouver. Tenders called shortly.

Sherbrooke, Que.

Tenders are called until March 15th for residence to cost $5,000, Murray street, for L. N. Audet. Architect, L. N. Audet, Sherbrooke. Two storeys, 33 x 48, cement brick, terra cotta, reinforced concrete floor, concrete foundation, electric lighting, hot air heating, metal roofing, hardwood finish.

St. Catharines, Ont.

Tenders are called for alterations to residence, cost $3,000, Ontario street, for J. D. Chaplin, Ontario street. Architect, A. E. Nicholson, St. Catharines. New panelled walls and decorating, oak floors, electric light fixtures and new draperies. Received by architect until March 16th.

Toronto, Ont.

Tenders are open for residence, cost $4,800, for Mr. Hartwick, 90 Waverley road. Architect, C. P. Stewart, Stair Building.

Tenders are open for three detached dwellings, cost $9,000, Glendman and Rowland, for F. Contemanche, 78 Howard Park avenue. Brick, stone foundation, shingle roof.

Plans are in progress for pair residences, cost $6,000, Jones ave., for Thos. Holmes, 106 Wells street. Architect, J. H. Stanford, Westmoreland ave. Two storeys, brick, stone foundation, hot air heating, electric lighting, tar and gravel roofing.

A. Stephens, 278 Wright avenue, will build a pair of residences on west side of Indian road. Brick, semi-detached, stone, shingle, 2 storeys.

Tenders are open for detached residence to cost $3,000, E. side Rainsford road, near Queen, for Ed. Elliott, 77 Vermont street. 2-sty., shingle roof.

Tenders are open for 2 pair residences to cost $10,000, cor. Gladstone and Howland avenue, for F. Courtmanche, 74 Howard Park avenue. Semi-detached, brick, stone foundation.

Geo. A. Mackay, 6 Al Fresco Lawn, will build 2 pair houses on Elmer ave. Cost $9,000. 2½-sty., detached, brick, hot air heating, tar and gravel roofing.

Plans are prepared for pair residences to cost $4,800, Pleasant avenue, near Yonge street, for T. R. Robinson, 425 Sumach street. Architect, E. G. Wilson, 77 Victoria street Semi-detached, brick, 2½ storey.

A permit has been granted for pair dwellings to cost $5,600, E.S. Claremont street, for Berenstin Bros., 145 Bathurst street. 2½-sty., semi-detached.

A permit has been granted for residence to cost $3,500, Woodbine avenue, for Edgar Laraway, 45 Woodbine Beach. 2-sty. and attic,

Tenders are open for residence to cost $5,000, Lee avenue, for Wm. Beney, 143 Lee avenue. Architect, J. H. Stanford, Westmoreland avenue. 2-sty. and attic, brick detached, concrete foundation, hot water heating, combination lighting, cut stone, plate and art glass, weather strips, shingle stain, shingle roofing.

Plans are drawn for residence to cost $4,400, Prescott avenue, for Norman Hey, East avenue. Architect, D. Brunhan, 16 Briswett avenue. 2-sty., solid brick, semi-detached, tar and gravel rfg.

Tenders are open for pair residences to cost $9,000, E.S. Rainsford road near Queen, for Ed. Elliott, 77 Vermont ave. Brick, tar and gravel roofing.

Plans are in progress for residence to cost $3,800, Radford avenue east of Indian road, for W. Colewell, 179 Delaware avenue. Architect, J. H. Stanford, Westmoreland ave., Toronto. 2½-sty., brick, hot water heating, art stone, hardwood floors, stucco, art glass, shingle roofing.

Vancouver, B.C.

Tenders are called for residence to cost $8,000, Shaughnessy Heights. Architects, Parr, McKenzie & Dav. 2½-sty., stone basement, frame, hot water heating, hardwood floors.

Tenders have been called for an apartment building to cost $55,000, 2nd and Yew streets, for D. S. MacDonald. Architect, W. P. White, Hutchinson Bldg., Vancouver. Four-storey, 66 x 120, brick, terra cotta face. Heating and plumbing are not included in general contract.

Westmount, Que.

Tenders will be called for residences, Cambridge street, for P. & M. Glickman, 124 St. Lawrence Blvd. Architect, Dufort & Decary, La Patrie Bldg., Montreal. Tenders to be called about April 10th by architects. 3½-sty., 25 x 72, brick, terra cotta, hot water heating, gas and electric light, hardwood floors, slate roof, open plumbing.

Winnipeg, Man.

Plans are being prepared for apartments. Architects, Hugh G. Molman, Fort St., Winnipeg. Solid brick, concrete foundation, electric lighting, stm. heating, gravel roofing, hardwood finish.

CONTRACTS AWARDED

Calgary, Alta.

Plans have been prepared for residence to cost $8,000, for Mr. Ross Wallace, 309 14th avenue east. Architect, Leo. Dowler. Two storeys, 32 x 40, brick veneer, concrete foundation, electric lighting, hot water heating, tile roof, hardwood interior finish. Owner is builder.

Residence to cost $6,000, Mount Royal, for G. D. Davidson. General contractor, Jones & Lvttle. Two-storey, 30 x 24, frame, concrete foundation, electric lighting, steam heating, shingle roofing, hardwood finish.

Residence to cost $5,000, 14th avenue west, for C. Veileix, 322 9th avenue E. Contractor, C. E. Guyun, 204 14th ave. E. 2½-sty., 28 x 36, brick veneer, concrete foundation, electric light, hot air heating, shingle roof, hardwood finish.

Hamilton, Ont.

A permit has been issued for 16 residences to cost $24,000, Sherman ave. and Gilkinson street, for M. Levy, 9 Windsor street. Brick construction. Owner is builder.

A permit has been issued to erect 26 residences to cost $33,800, Cameron st. east of Sherman, for Dr. G. E. Greenway, Main and East ave., Hamilton. Contractor, Henry Dunham, 18 Albion ave., Hamilton.

Residence to cost $15,000, for William Lees, c/o Lees, Hobson & Stevens, Bk. of Hamilton Bldg. Architects, Mills & Hutton, Bank of Hamilton Bldg. Painting, John Rogers, c/o architect; masonry, George Webb, 136 Stinson street; roofing, tin and slate, John E. Riddle, 12-14 Ferguson; carpentry, George Smith, 440 Mary street; heating and plumbing, W. D. Smith, 193 Main street; plastering, Hannaford Bros., 232 Robinson street. Total amount of tenders $15,000.

Montreal, Que.

Flats to cost $3,000, Hadley street, for George Mailloux, 164 Hamilton street, Montreal. General contractor, Ant. Marchant, 108 Hamilton street, Montreal. Two-storey, 25 x 40, brick, concrete foundation, gas and electric lighting, gravel roof.

4 flats, to cost $9,000, Davidson street, for Wilfred Quesnel, 212 Davidson St., (Emard Ward). Contractor, Ant. Marchand, 108 Hamilton street, Montreal. Three-storey, 37 ft. 6 in. x 45 ft., brick, concrete foundation, electric lighting, gravel roofing.

Excavation is done for 9 flats to cost $12,000, Papineau avenue, for Alfred Doutre, 853 Mount Royal avenue east. Architect, Arthur St. Louis, 80 St. Gabriel street, Montreal. 3-sty., 53 x 72, brick veneer, concrete foundation, gravel roof. Owner is builder.

Residences to cost $5,000, Florence st., for Thomas Kellett, 91 Belgrave ave., Montreal. General contractor, Jos. St. Denis, 107 Belgrave avenue, Montreal. 2-sty., 50 x 52, brick, concrete foundation, gravel roof. Excavation started.

Ottawa, Ont.

Work will commence shortly on a residence to cost $3,000, Mutchmore St., for B. Palif, 8 Adelaide street, Ottawa; brick veneer, concrete foundation, electric lighting, 22 x 38. Owner is builder.

Residence to cost $4,200, 4 Canal St., for C Brooks, 323 Flour street. Masonry, E. Spence, 12 Foster street. Brick veneer.

Toronto, Ont.

Residence and offices to cost $8,000, 502 Spadina avenue, for W. Kahnert, 16 St. Mary street. Architect, Sidney Watson, 18 Pleasant avenue. Builder, Walter Davidson & Co. 3-sty., brick, concrete foundation, hot water heating, structural steel, skylights, cut stone coursing, marble, sidewalk lights, mantles, tiles, hardwood finish, plate and art glass, galvanized cornice.

Residence to cost $4,200, Laws street near Annette, for A. Chisholm, 1702 Dundas street. Architect, Simon Locke, Niagara Falls. Builder, T. P. Wright & Sons, West Toronto. 2-sty., brick hot water heating, electric lighting, cut stone, marble, gas grates, mantles, tiles, hardwood finish, stucco, foot baths, plate and art glass.

Two pair residences to cost $8,000, Mutual North of McGill, for T. Bland Mutual and McGill streets. Builder, H. Williams, 190 Lee avenue, Toronto. 2½-sty., solid brick.

Pair residences to cost $6,000, Mont ray street near Sheridan, for G. Pearson, 176 Sheridan avenue. J. H. Galloway, 23 Toronto street, Toronto. Builder, F. Waite, 174 Sheriden avenue. 2½-sty., brick, stone foundation.

Pair residences to cost $7,600, Carns street, for David Clark, 27 Arthur St. Architect, J. H. Stanford, Westmoreland avenue. 2-sty., brick, shingle roofing. Owner is builder.

Business Buildings and Industrial Plants

Bridgeburg, Ont.

John H. Atwood, Dufferin street, will build a store to cost $15,000 on Jarvis street. 3-sty., 35 x 90, brick, concrete foundation, electric lighting, steam htg., gravel roof, hardwood finish, fire-escapes, refrigerators, telephones, modern plumbing, freight elevators.

Calgary, Alta.

Plans are being prepared for warehouse to cost $40,000, for C. S. Lyman Co.,(tanners), London, Ont. Manager, C. S. Lyman, London, Ont. Elevators, electric lighting, steam heating, and complete equipment for warehouse required.

Whitehead & Lawson plan to erect stores and apartments to cost $12,000, 17th avenue. Two-storey, 50 x 55, brick veneer, concrete foundation, electric lighting, steam heating, rubberoid roofing, steam boiler.

Lever Bros., Sunlight Soap Works, of Toronto, Ont., Canadian Manager, Mr. Knight, contemplate the establishment of branch factory in Calgary.

The Alaska Bedding Co., (head office Gomez and Sutherland streets, Winnipeg), has purchased 10 lots in East Calgary as building site for branch factory.

Coquitlam, B.C.

Plans are being prepared for a 40-room hotel, Prairie and Myrtle ave., for Real Estate Trust Co., 517 Hamilton street, Vancouver, (F. M. Newbury). Architect, J. J. Donnellan, 318 Pender street west, Vancouver. Three-storey, frame.

Galt, Ont.

Imperial Hotel, Manager, Mr. Lefavor, plan to rebuild the hotel recently damaged by fire. 10 bed-rooms, four sample rooms, pool room, etc., to be rebuilt.

Granby, Que.

Imperial Tobacco Co. plan to erect a 4-storey 60 x 200-ft. addition to their tobacco works.

Hamilton, Ont.

Plans are prepared for alterations to stores, 17-23 King street, for Brewster Company. Architects, Stewart & Witton, 2 Hughson street, Hamilton. Interior fittings and fixtures required.

T. W. Hand, 19 Homewood avenue, is planning to erect a 3-storey block, cor. Dundurn and King streets. Lower floors for stores, upper storeys apartments. No architect appointed.

The International Hotel, proprietor, Matthew Hayes, James & Barton sts., are planning a 30-room addition. New interior fittings will be required.

Plans are being prepared for stores and apartments, Gore street, for John Wright, 49 King William street, Hamilton. Henry Barnard, 116 Aberdeen ave. Architect, A. W. Peene, 2 King street west, Hamilton. Architect is preparing plans and specifications.

Duncan Lithographing Company, of which Frank Close is head, plan to erect a new building and machinery required for large paper box plant on Wellington street N. To use waste paper purchased throughout city.

Molsons Bank, 28 James street south, plan to erect a new branch near corner of Barton and Ottawa streets.

London, Ont.

Plans are being prepared for six-sty. store, Dundas street, for Douglas Grand c/o Llewellyn Meredith, Talbot street, London. Architect, H. C. McBride, London. Six storeys, brick, steel, concrete, elevators, electric lighting and equipment, heating system, complete store fittings.

Montreal, Que.

The Gelinas Freres (dry goods), 1858 St. Lawrence Boulevard, Montreal, intend erecting a large store on property recently purchased, 50 ft. frontage.

Tenders will be called on April 10th for remodelling grocery warehouse for A. Adlestein, 5 Place Royal, Montreal. Architect, Dufort & Decary, La Patrie Bldg., Montreal. Four storeys, 25 x 40,

(Continued on page 73)

Tenders and For Sale Department

To Architects and Engineers

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

Tenders and Designs for an Aqueduct

Canadian Pacific Railway Company

Department of Natural Resources Irrigation Branch

Sealed tenders, addressed to the undersigned and endorsed "Proposal for Brooks Aqueduct," will be received up to noon of **May 1st, 1912.**

The site of the work is about four miles southeast of Brooks, Alberta, a station on the main line of the Canadian Pacific Railway, 125 miles east of Calgary. The aqueduct is about 10,000 feet long and 54 feet maximum height, and is designed to discharge 910 cubic feet per second.

Tenders will be received based either on the design prepared by the Company's Engineer or on designs to be submitted by the bidder. The Engineer's design involves the furnishing and placing of about 23,400 cubic yards of concrete and 3,640,000 pounds of reinforcing steel, together with excavation and filling to the amount of 40,000 cubic yards.

All labor and materials required will be at the expense of the Contractor.

Bidders will be required, either personally or by representative, to visit and inspect the site and satisfy themselves as to local conditions, supply of material, etc.

Plans, specifications and full information may be obtained on application to A. S. Dawson, Chief Engineer, Calgary.

A deposit of $300 will be required before plans or specifications will be given out, which will be returned on receipt of the same in good condition.

All proposals must be accompanied by a certified cheque payable to A. S. Dawson, for five per cent. of the amount of the tender, to be forfeited as liquidated damages in case the bidder neglects or refuses to enter into a contract should the work be awarded to him.

Proposals will not be considered unless made on the form provided. Interlineations, alterations or qualification prices, except as therein provided for, may invalidate porposals.

The Company reserves the right to reject any or all tenders and to waive defects.

A. S. DAWSON,
Chief Engineer,
Department of Natural Resources,
Canadian Pacific Railway.
Calgary, Alta., March 1, 1912. 9-12

TENDERS

Tenders endorsed "Tender for Garbage Incinerator," and addressed to His Worship the Mayor, will be received at this office until noon on **Wednesday, March 27, 1912,** for the construction of a Garbage Incinerator and accessories complete, in accordance with specifications on file at the City Engineer's Office, where forms of tender and all information may be obtained.

The right is reserved to reject any or all tenders or to accept any that may be considered in the interest of the City.

By Order,
J. J. HOPEWELL,
Clerk of Works.
City Works Office, Halifax, N.S.,
February 28, 1912. 10-11

CITY OF MOOSE JAW, SASKATCHEWAN

Tenders for Steam-Electric Machinery

Sealed tenders will be received by the City Commissioners, Moose Jaw, Saskatchewan, Canada, up to 10 a.m., **March 30th, 1912,** for the following:—

Contract "A"—One 1,500 K.W. A.C. Steam Turbo-generating set.

Contract "B"—One 500 K.W. A.C. Generator, direct connected to Diesel Oil Engine.

Full particulars and specifications can be obtained on application to J. D. Peters, Electrical Superintendent.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT, City Commissioners.
W. F. HEAL,
9-11

Notice to Contractors

THE TEMISKAMING AND NORTHERN ONTARIO RAILWAY COMMISSION

Toronto, February 24th, 1912.

Sealed tenders for the works (other than steel bridges) necessary to the complete construction of the roadbed ready for the ties and rails upon that section of the Temiskaming & Northern Ontario Railway Commission's railway extending from Earlton to Elk Lake, will be received at the office of the Secretary of the Commission, 25 Toronto Street, Toronto, until twelve o'clock (noon) on the Twentieth day of March, 1912.

On receipt of a request in writing, a copy of each of the following documents:—

Instructions to Bidders;
Form of Tender;
Specifications;
Form of Contract;

will be furnished to intending bidders at the office of the Secretary of the Commission, Toronto; or at the office of the Chief Engineer of the Commission, North Bay, where plans and profiles pertaining to the work may also be seen.

The right is reserved to reject any or all bids.

A. J. McGEE,
Secretary, Temiskaming and Northern Ontario Railway Commission

N.B.—Papers inserting this advertisement without authority will not be paid for it. 10-11

Notice

to Builders of Fire Apparatus

Tenders will be received by the undersigned up to **April 1st, 1912,** for the construction of a Modern City Service Hook and Ladder Truck, Horse Drawn, for the City of Niagara Falls, Canada.

Specifications and all particulars may be obtained by addressing

W. J. SEYMOUR, City Clerk.
Niagara Falls, Ontario.
February 29th, March 1, 2. 10-11

CITY OF TORONTO

Main Drainage Works

Sealed tenders addressed to the Chairman of the Board of Control, City Hall, will be received by registered post only. up to noon of **Tuesday, March 26th, 1912,** for the supply of Electrical Equipment for Pumping Station, Sewage Disposal Works.

The equipment includes:

One 200 horse power vertical motor;
Two 75 horse-power vertical motors.
One 9-panel switchboard.

Plans, specifications, forms of tender and other information may be obtained at the office of the City Engineer, Toronto, Ont.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor.
Chairman Board of Control
10-12

FOR SALE

Centrifugal Pump

For Sale—Practically new, Centrifugal Pump, 4-in. Suction, 3-in. Discharge; driven by Double Cylinder, 2 Cycle Gasoline Engine, direct connected, and complete Rubber Hose and Piping necessary. In service only a few months; guaranteed in first class condition.

Address W. G. GIBSON,
9-11 Box 112, Port Hope, Ont.

CITY OF SASKATOON

Tenders for

Labor on Storm Sewer

Sealed tenders, addressed to the City Commissioners, and endorsed "Tender for Labor or Storm Sewers," will be received up to twelve o'clock noon on **Friday, March 29th, 1912,** for the laying of approximately 8,990 lineal feet of Storm Sewers, and the construction of Manholes, Catch Basins and Appurtenances.

The Corporation reserves the right to reject any or all tenders. All information may be obtained on application to George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL,
E. M. SNELL, City Commissioners
Saskatoon, Sask., Feb. 24, 1912. 10-11

Plant For Sale

One No. 4 stone crusher, jaw; capacity, 10 tons per hour.

One 30 horse power upright boiler.

One 30 horse power Leonard Clipper engine.

One 12-ton road roller.

The entire plant has only been used one season, in all about four months, and is in first-class condition and ready to go to work as soon as fittings could be placed. Immediate delivery, as the plant has not been working since last August. For full particulars and terms apply to

R. E. GILLESPIE,
McGill College Avenue,
8-11 Montreal, Que.

Corporation of the Town of Welland, Ontario

Tenders are invited for the construction of approximately 37,000 square yards of Pavement, in Vitrified Brick, Bitulithic, Asphalt Block or Granitoid.

Plans, Specifications, etc., may be seen at the office of the Canadian Engineer, 62 Church street, Toronto, or at the Town Engineer's office, Welland, where further particulars can also be obtained if desired.

Sealed tenders fully endorsed are to be deposited with the Town Clerk, Town Hall, Welland, not later than twelve noon, March 18th, 1912.

An accepted bank cheque for $8,000 must accompany each bid. Cheques will be returned on unsuccessful tenders.

The lowest or any tender not necessarily accepted.

By order of Roads & Bridges Committee.

GEO. H. BURGAR,
Chairman R. & B. Committee.
GEORGE R. BOYD, Town Clerk.
Welland, March 26, 1912. 10-11

CITY OF PRINCE ALBERT

Tenders For Sewer and Water Works Construction

Sealed tenders addressed to the undersigned and marked "Tenders for Construction," will be received by the City Commissioners until noon on **Friday, the 29th day of March, 1912,** for the construction of the following works:—

Contract 12 A.—Water main extensions for 1912 approximately 23,000 lin. feet water main with necessary valves and hydrants.
Contract 12 B.—Sewage Pumping Station No. 3. Sewage Pumping Main No. 3. Sewage Flushing Chamber No. 3. 8,000 lin. feet Vitrified Pipe Sewer.
Contract 12 C.—Extension of Main Intercepting Sewer. 5,000 lin. ft. Concrete Sewer. 4,000 lin. ft. Vitrified Pipe Sewer.
Contract 12 D.—Sanitary Sewer Extensions. 25,610 lin. ft. Vitrified Pipe Sewer.
Contract 12 E.—Storm Sewer Extensions. 4,000 lin. ft. 18-in. and 15-in. Vitrified Pipe Stotm Sewer, with catch basins and connections.
Contract 12 F.—House Connections for 1912.
Contract 12 G.—2,400 lin. ft. Concrete Outfall Sewer. Sewage Disposal Works.

Instructions to Bidders, Specifications and Plans may be seen and forms of Tender obtained at the office of the City Engineer of the City of Prince Albert after Monday, the 18th day of March, 1912.

Tenders must be submitted separately for each Contract and must be accompanied by a marked cheque to the amount of five per cent. of the amount of the tender, made payable to the Secretary of the City of Prince Albert.

C. O. DAVIDSON,
Secretary-Treasurer.
Dated at Prince Albert, Sask.
February 29th, 1912. 11

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. Chicago, Ill.

CITY OF MOOSE JAW

TENDERS for Line Material

Sealed tenders marked "Tenders for Line Material," addressed to the City Commissioners, Moose Jaw, will be received up to 10 a.m., **Tuesday, March 26th, 1912,** for the supply and delivery of the following line material, for the Electrical Department,—

Section 1. Copper and Iron Wire.
" 2. Cedar Poles.
" 3. Cross Arms.
" 4. Pole Line Hardware.
" 5. Miscellaneous Line Supplies.

Specifications and all information may be obtained on application to J. D. Peters, City Electrician.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT, City Commissioners.
W. F. HEAL,
Moose Jaw, Feb. 29, 1912. 10-11

Canadian Pacific Railway Company

Department of Natural Resources
Irrigation Branch

Tenders for Steel Highway Bridges

Sealed tenders, addressed to the undersigned, will be received up to noon of **April 15th, 1912,** for the design, manufacture and erection complete on piers to be provided by the Railway Company, of the following Steel Highway Bridges:—

Two Bridges, span 125 feet.
Four Bridges, span 100 feet.
Fourteen Bridges, span 75 feet.
Nine Bridges, span 60 feet.

Contract, specification, form of tender and general instructions may be had on application to the undersigned. A deposit of $25.00 will be required before specifications will be given out, which will be returned on receipt of a bona fide tender.

Tenders will only be received from parties who can show a reasonable acquaintance with work of the required character, and that they have the facilities and plant necessary for work of such magnitude.

A certified cheque or cash deposit to the amount of five per cent. of the tender must accompany all bids as a guarantee that the bidder will enter into a contract for the work should it be awarded to him, and which will be forfeited as liquidated damages should the bidder default.

Cheques or deposits of the unsuccessful bidders will be returned within ten days after the award of the contract.

The right is reserved to the Company to reject any or all tenders and to waive defects.

A. S. DAWSON,
Chief Engineer.
Calgary, Alta., March 1, 1912. 11-14

CITY OF SASKATOON

Tenders for Labor on Sanitary Sewer and Water Construction

Sealed tenders addressed to the City Commissioners and endorsed "Tender for Labor on Sewer & Water Construction," will be received up to 12 o'clock noon, **Friday, March 29th, 1912,** for the laying of approximately 13 miles of Sanitary Sewer and Water Mains, and construction of all necessary Manholes and Flushtanks, setting of Fire Hydrants and Gate Valves, etc., as shown on Plans and Profiles, and according to the Specifications. The Corporation reserves the right to reject any or all tenders. All information may be obtained on application to George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL,
E. M. SNELL, City Commissioners.
Saskatoon, Sask., Feb. 24, 1912. 10-11

City of Moose Jaw, Sask.

TENDERS For Sewer and Water Extensions

Sealed tenders marked "Tenders for Sewer and Water Extensions," addressed to the City Commissioners, Moose Jaw, will be received up to noon of **Monday, March 29th, 1912,** for the installation of approximately three miles of 8 and 10-inch sewer mains and 6-inch water mains.

Plans, specifications and any further information may be obtained from J. Antonisen, City Engineer.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT, City Commissioners.
W. F. HEAL,
Moose Jaw, Sask., March 12, 1912. 11-12

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA.

To Canadian Architects

Competition for New University Buildings to be erected at Point Grey, near Vancouver, British Columbia

The Government of British Columbia invite Competitive Plans for the general scheme and design for the proposed new University, together with more detailed Plans for the buildings to be erected first at an estimated cost of $1,500,000.

Prizes of $10,000 will be given for the most successful Designs submitted.

Particulars of the competition and plan of site may be obtained on request from the undersigned.

The designs to be sent in by July 31st, 1912, addressed to

THE MINISTER OF EDUCATION,
Parliament Buildings,
10-15 Victoria, British Columbia.

Town Engineer

Sault Ste. Marie, Ont.

Sealed applications, marked "Position of Town Engineer," stating qualifications and experience of applicant and salary required, will be received by the undersigned up to 5 p.m., March 21st, 1912, for the position of Town Engineer.

11 C. J. PIM, Town Clerk.

CITY OF TORONTO

Main Drainage Works

Sealed tenders, addressed to the Chairman of the Board of Control, City Hall, will be received by registered post only, up to noon of **Tuesday, March 26th, 1912**, for the construction of Section No. 15 (Rosedale Creek Syphon) High Level Interceptor. The work covers the laying of 5,700 lineal feet of 42-inch reinforced concrete pressure pipe.

Plans, specifications, forms of tender and other information may be obtained at the office of the City Engineer, Toronto, Ont.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
11-12 Chairman, Board of Control

City of Moose Jaw, Sask.

Tenders for Fire Hose

Sealed tenders marked "Tenders for Fife Hose," addressed to the City Commissioners, Moose Jaw, will be received up to noon of **Monday, March 25th, 1912**, for the supply and delivery of 500 feet 2½-inch, 3-ply cotton, rubber-lined fire hose. Parties tendering must also submit samples.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT, City Commissioners.
W. F. HEAL,
Moose Jaw, March 4th, 1912. 11-12

CITY OF PORT ARTHUR

Notice

Sealed separate tenders, endorsed on envelope, "Tender for Paving," will be received by the undersigned up to 6 o'clock p.m. of **Monday, April 8th, 1912**, for paving the following streets:

Pearl street from Water to Court, curb and gutter, 1,836 lin. ft.; pavement in sq. yds., 4,360.

Bay street from Cumberland to Algoma, curb and gutter, 2,930 lin. ft.; pavement in sq. yds., 4,784; track laying, 3,250 sq. yards.

Algoma street from Bay to Queen, curb and gutter, 4,000 lin. ft.; pavement in sq. yards, 5,785; track laying, 4,340.

Totals, curb and gutter, 8,766; pavement in sq. yds., 14,929; track laying, 7,590 sq. yards.

Tenders will be received for Sheet Asphalt, Asphalt Block and Bitulithic.

Further instructions as to specifications and forms of tender may be obtained from L. M. Jones, City Engineer, Port Arthur.

A marked cheque for ten per cent. of the estimated amount of contract must accompany each tender.

The lowest or any tender not necessarily accepted.

J. McTEIGUE, City Clerk.
Corporation Offices, Port Arthur.
March 9th, 1912. 11-14

Special Notice to Contractors

Could supply you with any quantity of relaying rails or for reinforcing concrete at a very low price, B. Shragge Iron & Metal Company, 396 Princess street, Corner King; Telephone St. John 373, Winnipeg. 11-23

TENDERS

Bulk and separate tenders will be received by Mr. J. Wall, General Manager of British Canadian Canners, Limited, Lister Block, Hamilton, Ont., for the several works required in the execution of canning factories, warehouses, etc., at Cobourg, Bowmanville, Port Robinson, Berlin and Highgate, Ont. Tenders close at noon, **Saturday, March 23, 1912.** Plans and specifications may be seen on and after the 12th inst. at the residence of the local manager at above places, at the company's offices at Hamilton, and at the offices of Munro & Mead, arcnitects, Chancery Chambers, Hamilton.

The lowest or any tender not necessarily accepted. 11-12

CITY OF LETHBRIDGE

Grading Sanitary Sewers Cement Walks, Curb and Gutter

Sealed tenders addressed to the Secretary-Treasurer of the City of Lethbridge and endorsed "Tender for Grading," etc., as the case may be, will be received hy registered post only up to noon of **Thursday, April 11, 1912.**

Approximately 2½ miles of Sanitary Sewers.

Approximately 3½ miles of Cement Walks, (Curb and Gutter in addition).

Approximately 7 miles of Grading.

A deposit in the amount of $500 must accompany any tender on each contract. A bond in the amount of $8,000 will be required of successful bidder. The lowest or any tender not necessarily accepted.

Plans and specifications can be obtained from the City Engineer and are also on file at the office of this journal, Commercial Travellers' Building, Winnipeg.

A. C. D. BLANCHARD, City Engineer.
G. W. ROBINSON, Serretary-Treasurer.
11-12

COUNTY OF HALDIMAND

Tenders For Road Machinery

Tenders are invited by the Corporation of the County of Haldimand for furnishing one Steam Road Roller, one Rock Crusher outfit, three Graders, one Rooter, six Spreader Wagons, one Sprinkling Tank, one Traction Engine, one Rock Drill and thirty-six Steel Levellers on the principle of the split log drag.

Blank forms of Tender and complete information may be obtained by applying by letter to Alan Mair Jackson, County Engineer, Dunnville, Ont.

Sealed tenders, which must be made on the prescribed form, will be received up to six p.m. on **Monday, March 25th, 1912**, by registered letter, plainly marked on the outside of the envelope, "Tenders for Road Machinery," and addressed to the undersigned.

Tenders will be opened in Committee Meeting and if approved will be recommended to the County Council for acceptance.

The lowest or any tender not necessarily accepted.

W. D. ROULSTON,
Chairman County Road Committee,
Garnet, Ont.,
Haldimand County.

TENDERS

Tenders will be received up to 6 p.m., **Monday, March 25th, 1912**, for the erection and completion of an eight room Public School, including heating and plumbing, to be built corner of Jane and Harvey streets, North Bay, Ont.

Plans, specifications and details may be seen at the office of the Architect, H. W. Angus, Mc Cool Block, North Bay.

Tenders to be addressed to E. H. Young, Secretary Public School Board, North Bay, Ont

Successful tenderer will be required to furnish security.

The lowest or any tender not necessarily accepted.

Sealed tenders, endorsed "Tender for Registry Office," addressed to the undersigned, for the erection of an addition to the Registry and Land Titles Office, North Bay, including separate tenders for plumbing, heating and electric wiring, will be received at this Department until **Monday, the 26th of March, 1912.**

Plans and specifications for the above work can be seen at this department and at the Registry Office, North Bay.

An accepted bank cheque, payable to the Honorable J. O. Reaume, Minister of Public Works, for five per cent. of the amount of the tenders, and the bona-fide signature and addresses of two sureties or the name of a guarantee company approved by this department, prepared to give a bond for the due fulfilment of the contract, must accompany each tender. The Department will not be bound to accept the lowest or any tender.

By order,

H. F. McNAUGHTON,
Secretary Public Works, Ontario,
Department Public Works, Ontario.

Toronto, March 9th, 1912.

Newspapers publishing this advertisement without authority will not be paid for it. 11

CITY OF REGINA

Province of Saskatchewan

Sealed tenders addressed to the City Commissioners, Regina, will be received until noon on **Monday, March 28th, 1912**, for the construction of:

7272 lin. ft. 45-in. reinforced concrete sewer pipe.
3155 lin. ft. 42-in. reinforced concrete sewer pipe.
2777 lin. ft. 40-in. reinforced concrete sewer pipe.

Earthwork

The excavation of a trench for and the laying therein of a reinforced concrete sewer pipe from:

(1st) The intersection of Campbell street and Seventh avenue to the intersection of Edward street and Fourteenth avenue, a distance of about 7272 lineal feet, and

(2nd) Edward street and Fourteenth avenue to a point on Nineteenth avenue east of Angus street, a distance of about 5932 lineal feet.

Sewage Disposal Work

Two Filter Beds.

One Stand-bye Tank.

Pipe lines connecting the various parts of the Works.

Concrete blocks for false floors in Filter Beds.

Steel Roofs for Filter Beds.

Tenders for the whole or any part of the above works will be considered.

The City reserves the right to reject any or all bids, and to waive any irregularities therein.

Copies of Plans, Specifications, Schedules and form of Tender and full information may be had from the undersigned.

J. M. MacKAY, Chief Engineer,
Trunk Sewer Works.
Regina, March 4th, 1912. 11-13

Town of Oakville, Ontario

Sealed tenders will be received by the undersigned up to the **1st** of April, **1912**, for the construction of Main Sewerage and Sewage Disposal Works in the Town of Oakville.

Specifications may be obtained from and plans seen at the office of the Engineer, T. Aird Murray, 303 Lumsden Building, Toronto.

The lowest or any tender may not be accepted.

C. A. BRADBURY, Town Clerk,
11 Oakville, Ontario.
G. HILLMER, Mayor.

CITY OF MOOSE JAW,
SASKATCHEWAN

Notice

Sealed tenders, marked "Tenders for Street Cleaning Machinery," addressed to the City Commissioners, Moose Jaw, will be received up to noon of **Wednesday, March 20th, 1912**, for the following machinery:—

Two street sweepers (to sweep 8 feet wide) for teams.
One extra heavy street grader.
Three dump carts of 1½ cu. yd. capacity.
One wagon with dump box (2 cu. yd. cap.).
Six patrol carts for street cleaning.
One heavy grader plow, with iron beams.
Two dozen hand brooms for street sweeping, about 18 inches long.

Tenders will be received for all or each separate item.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.
Moose Jaw, March 9, 1912. 11

For Water Meter Tenders

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, up to noon on **Tuesday, March 26th, 1912**, for one 30-inch Venturi water meter, for the Water Works Department.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Tenderers shall submit with their tenders the name of two personal sureties, approved by the City Treasurer, or in lieu of said sureties the bond of a guarantee company, approved as aforesaid.

Specifications may be seen and forms of tenders obtained at the office of the City Engineer, Toronto.

The usual conditions relating to tendering, as prescribed by city by-law, must be strictly complied with, or the tender will not be entertained.

The lowest or any tender not necessarily accepted.

G. R .GEARY, Mayor,
Chairman, Board of Control.
City Hall, Toronto,
March 8th, 1912.

Situations Vacant

Advertisements under this heading two cents a word per insertion. Box No. ten cents extra. Minimum charge 25 cents

Salesman Wanted

To handle as a side line an Anti-Corrosive and Waterproof Paint for all kinds of structural steel and bridge work, concrete work and shipbuilding. Manufactured in England. Only a first class man wanted. Address Box 460, Contract Record. 11-12

TOWN OF BRAMPTON

Sealed tenders addressed to the undersigned and endorsed "Tender for Reservoir" or "Tender for Pumping Equipment," will be received up to **6** p.m. **Tuesday, March 26th, 1912**, for the construction and supply of the following:

(a) Concrete Reservoir.
(b) Two Turbine Pumps and Motors.

General conditions, plans and specifications can be obtained at the Municipal Office of the Town and from the Engineer.

A marked cheque for $300 will accompany tender for reservoir.

Separate tenders on the above will be considered and the lowest tender in either case need not necessarily be accepted.

J. G. ROBERTS,
Chairman Brampton Waterworks Commission.
11 WM. TREADGOLD, Engineer.

Business Buildings and Industrial Plants

(Continued from page 69)

heavy mill construction, brick on steel frame, gravel roof.

Regina, Sask.

Tenders are in for tent and mattress factory to cost $18,000, Warehouse district, for Saskatoon Tent & Mattress Co., Regina, head office Saskatoon. Architect, Reilly, Dawson & Reilly, Regina. 2-sty., 50 x 125, solid brick, reinforced concrete, electric light, hardwood floors, steam heating, patent roofing, electric motors, power sewing machines, freight elevators. Contract to be awarded March 25th.

St. Catharines, Ont.

Tenders are called for stores, cost $5,000, St. Paul street, for H. A. Bald & Company, St. Paul street, St. Catharines. Architect, A. E. Nicholson, St. Catharines. Two storeys, 16 x 60, steel and terra cotta, concrete foundation, gas and electric light, steam heating, felt and gravel roofing. Received by Architect until March 23rd.

Saskatoon, Sask.

The Sawyer Massey Co., Hamilton, manufacturers engines and separators, will build a modern warehouse this summer, on 1st avenue to cost $150,000.

Toronto, Ont.

Plans are in progress for pair stores and residences to cost $6,000, 449 Ossington avenue, for J. H. Stanford, (in trust), 17 Westmoreland avenue, Toronto. 3-sty. and basement, tar and gravel roofing.

A permit has been granted for stores and 3 attached residences to cost $9,000, N. side Bloor W. near Russet, for Davis & Moore, 176 St. Clarens avenue. Solid brick, tar and gravel roof.

Vancouver, B.C.

Plans are prepared for dyeing and cleaning works, $15,000, Granville st., near Pacific, for Granville Bros., 851 Granville street. Architects, Parr, McKenzie & Day, 570 Granville street. Two storeys and basement, fireproof, 26 x 120.

Winnipeg, Man.

Plans are being prepared for garage. Architect, Hugh G. Holman, Fort St., Winnipeg. Fireproof and steel construction, concrete foundation, electric lighting.

CONTRACTS AWARDED

Brantford, Ont.

Creamery to cost $3,500, Grey street, for R. T. Stillman Contractor, C. W. Silk. 2-sty., 36 x 80, brick, concrete foundation, electric lighting, tar and gravel roofing. Upper floor supported by 10-in. x 10-in. beams on 8-in. x 8-in. posts.

Calgary, Alta.

Warehouse to cost $15,000, 8th ave. west, for G. D. Venina, 13 avenue west. Architect, W. Laing. General contractor, Christie Bros., Calgary. 2-storey, 100 x 25, brick, concrete foundation, electric lighting, steam heating, tar and gravel roofing. Plans being prepared. Work has not started.

Carriage shop to cost $5,000, 10th ave., for W. J. Gourlay, 614 6th avenue west, Architects, Lang & Major; general contractor, Colins Bros. Two storeys, 40 x 120, brick veneer, concrete founration, electric lighting, Ruberoid roofing.

Garage to cost $3,000, 11th avenue, for V. N. DeNiele. General contractor, McDougal & Foster, two storeys, 90 x 120, brick, concrete foundation, electric lighting, steam heating, Ruberoid rfg.

Warehouse to cost $55,000, 11th ave. west, for Nicholson & Bain. Architect, E. W. Crayston, 572 Ross avenue, Winnipeg. General contractor, McNeill & Trainor, Box 14, Calgary. 6-sty., 51 x 120 walls, stone and brick, floors slow burning, concrete foundation, electric lighting, steam heating, felt and gravel roofing, B.C. fir finish, fire escapes, vaults, 2 freight elevators.

Hamilton, Ont.

Knitting Mills, on John street N., for Canadian Knitting Co. Architect, Stewart & Witton, 2 Hughson street, Hamilton. Plumbing and heating for new building awarded to Robert Fitzsimmons, 15½ Main street, Mamilton, $4,800.

Addition to canning factory to cost $3,500, Trolley street and Maple ave., for A. W. Wagstaffe, Ltd., Trolley St. and Maple avenue. Contractor, George F. Webb, 138 Stinson street, Hamilton. Architect, A. W. Peene, 2 King street west.

Addition to brush factory, Wood market, for Walter Woods Co., president, Walter Woods, MacNab street N., Hamilton. Contractor, George E. Mills, 614 Main street east, Hamilton.

Warehouse for Oliver Chilled Plow Works Co., Hamilton. Architect, Prack & Perrine, Gilkinson street, Hamilton. Contract awarded to H. G. Christman & Son, Gilkinson street. 4-sty., steel, concrete and brick warehouse.

Work will start at once on stores and apartments to cost $8,000, King street and Garfield avenue, for Arthur I. McFadyen, 9 Garfield avenue. Architect, Watt & Blackwell, Lister Bldg., Hamilton.

Addition to broom factory, cost $5,000, McNab street, for Walter Woods Co., MacNab street, N. Hamilton. Contractors, George E. Mills, 614 King st. east, Hamilton.

Montreal, Que.

Bottling Works and stable, to cost $4,500, 103 Duvernay street, for La Reina Mineral Water Co., 1302 Notre Dame street west, Montreal. Architect, Alphonse Piche, 52 Victoria Square, Montreal. Contractor, R. Hamelin, 553 St. Ambroise street, Montreal. 2-sty., 52 x 50, brick and wood, concrete foundation, electric lighting, gravel roofing.

Alterations to hotel to cost $20,000, corner Windsor and James streets, for

Queen Hotel Company, Montreal. General contractor, P. Lyall & Sons Construction Company, Limited, Mintreal. New flooring, wall, ceilings and alteration to bar, sitting room and main corridor. Work has been started.

Plans have been prepared for alterations to stores and residences, cost $8,000, for Cockels & Pinos, 220 St. Catherine street west, Montreal. General contractor, William Brown, 73 Fort St., Montreal. Two storeys, 44 x 36, brick and concrete, concrete foundation, gas and electric lighting, gravel roof. Converting ground floors into stores, etc.

Ottawa, Ont.

Stores and residences, cost $3,800, Preston street, for F. N. Amey and J. S. Polson, Ottawa. Architect, J. P. McLaren, 104 Sparks street, Ottawa. General contractor, S. J. Hunt, 131 Spadina avenue. Brick veneer, solid brick, 40 x 34 and 40 x 18, concrete foundation, electric lighting.

Quebec, Que.

Addition to stores to cost $20,000, St. Paul street, for A. Toussaint & Co., St. Paul street, Que. General contractor, A. Dugal, Queen St., Que. 4-sty., 50 x 75, stone and wood, stone foundation, electric lighting, hot water heating, galvanized iron roof, hardwood flooring, freight elevator. This is an addition to present structure.

St. Catharines, Ont.

Store, St. Paul and Mary streets, for Thomas Nihan. Architect, A. E. Nicholson, 48 Queen street. General contractor, Newman Bros., 75 St. Paul street. Carpentry, G. W. Carl, St. Catharines.

Thorold, Ont.

Alterations to branch bank, for Imperial Bank (head office Toronto). Contractors for interior fixtures, new front, etc., Newman Bros., 75 St. Paul street, St. Catharines.

Toronto, Ont.

Two stores and billiard room, cor. McGee and Queen street. Architects, Mallory & Thatcher, Queen street west. Excavation and masonry, J. C. Cardwell. Carpentry, Mr. Dunn.

Shoe store to cost $4,200, 96 St. Clair avenue, for Harry Bell, 1212 Dufferin street. Architect, W. C. Mason, 358 Montrose avenue. Builder, F. Bell, 35 Vanauley street, Toronto. 2-sty., brick, stone foundation, tar and gravel roofing.

Tremont Hotel to cost $100,000, Yonge street. Owner, P. J. Mulqueen, Yonge street. Architect, J. Wilson Gray. Masonry, Brown & Love. Carpentry, T. J. Sullivan. Plastering, W. J. Haynes. Electrical, O'Connor Electrical Company.

Warehouse to cost $20,000, Bay street, for Backrack Bros. Architects, Dennison & Stephenson, Stair Bldg., Bay street, Toronto. Masonry, H. N. Dancy & Son. Steel, W. H. Salter; carpentry, E. R. French; paint and glass, J. J. Brennan; plumbing, heating and ventilation, Purdy Mansell Ltd; sprinkler, Purdy Mansell, Ltd.; miscellaneous sheet metal, W. E. Dillon & Co., Ltd.; 4-sty. and basement, steam heating, structural steel, skylights, concrete walls, metal sash, plate glass.

Winnipeg, Man.

Office building to cost $380,000, for Union Trust Company. Architect, John D. Atchison, Bank of Toronto Building, Winnipeg. General contractor, Geo. A. Fuller Company, 1001 Union Bk., Winnipeg. Stone and marble, Western Stone Company, Ltd., Desautels and Youville street, St. Boniface, Man.

Power Plants, Electricity and Telephones

Calgary, Alta.

City Engineer J. T. Child has been recommended to purchase 140 magnetite arc lamps, 2,000 c.p.; 464 ornamental standards, 400 c.p. Cost $10,497.

Hamilton, Ont.

The Bell Telephone Co., head office Montreal, Que., plan to erect building in Eastern Annex Exchange.

W. A. Wood, of Brantford, representing automatic telephone company, is trying to interest the Hamilton council in the installation of the new system. Bell Telephone Company's franchise expires this year. Mayor, George H. Lees, Hamilton.

Moose Jaw, Sask.

City Commissioners, A. W. Maybery, L. W. Rundlett, W. F. Heal. City Electrician, J. D. Peters. Tenders received by Commissioners until March 26th for supply of copper and iron wire, cedar poles, cross arms, pole line hardware, miscellaneous line supplies Plans, etc., at Electrician's office, Moose Jaw.

Ottawa, Ont.

Ottawa Lighting Department contemplates 4,000 lin. feet of lighting system ("Great White Way") on Rideau street. Electrical Superintendent, J. E. Brown.

Plans have been prepared and construction will probably start in spring on the construction of an electrical conduit. City of Ottawa. City Engineer, N. J. Ker.

Saskatoon, Sask.

Hoeschen Wentzleu Company are contemplating an addition to power plant for brewery to cost $20,000, Nutana. Brick building to have dynamos and mechanical equipment.

St. John, N.B.

Construction will start in May on Hydro Electric plant to cost $2,000,000 for New Brunswick Hydro Electric Power Co, St. John. Company have secured water rights on Lepreaux and Magaguadavic Rivers (13,000 acres). 10,000 horse power to be developed.

Toronto, Ont.

Tenders are called for electrical equipment, Main Drainage works. Mayor, G. R. Geary. City Engineer, C. H. Rust. Received until March 26th for: one 200-h.p. vertical motor: two 75-h.p. vertical motors; one 9-panel switchgineer's office.

Winnipeg, Man.

Contract for transformers to cost $13,595 is awarded to Canadian General Electric Company, Toronto, at $13,595. Three 350 kw. transformers at Tyndall, Man.

Miscellaneous

Ottawa, Ont.

The city will be in market shortly for fire equipment: two 35-gal. chemical tanks with 250 ft. of hose and mounted on hose wagon; 2000 ft. of 2½-in. fire hose.

Verdun, Que.

The by-law carried to provide $20,000 for fire protection. Address Town Engineer.

New Companies

The Beaver Dredging Company, Limited, have been incorporated with a capital stock of $300,000 to carry on a general construction business with head office at Lancaster, N.B. The incorporators are H. Mayes, C. B. Lockhart, of St. John, N.B.

New Orleans and Grand Isle Traction ways, railways, telephone and telegraph Light and Power Company, Limited, have been incorporated with a capital stock of $10,000,000 to construct tramlines, to acquire timber limits, water powers, etc., and carry on business as a general light and power company with head office at Toronto. The incorporators are W. V. Carey, L. E. Awrey, and C. W. Mitchell, all of Toronto.

The Howser Lake and Lardo River Lumber Company, Limited, has been incorporated with a capital stock of $250,000, to deal in timber, lumber and all similar products, with head office at Winnipeg, Man. The incorporators are H. S. Edwards, J. Haffner and Alex. Haggar, all of Winnipeg.

Land and Finance Corporation of British Columbia, Limited, has been incorporated with a capital stock of $2,500,000, to build and operate railroads, bridges, tramways, telephone lines, sawmills, planing mills, reservoirs, etc., with head office at Vancouver, B.C. The incorporators are O. B. McCallum, G. F. Gyles and R. L. Jones, all of Montreal, Que.

Notre Dame de Graces Realty Company, Limited, has been incorporated, with a capital stock of $200,000, to carry on business as engineers, architects, builders, manufacturers and mechanics, with head office at Montreal, Que. The incorporators are C. A. Wilson, A. Verville, of Montreal, and R. Lanctot, of St. Constant, Que.

Canadian Consolidated Lands Limited has been incorporated with a capital stock of $1,300,000 to carry on a general land and building business with head office at Montreal. The incorporators are J. M. Montle, R. E. Allen and S. G. Dixon, all of Montreal, Que.

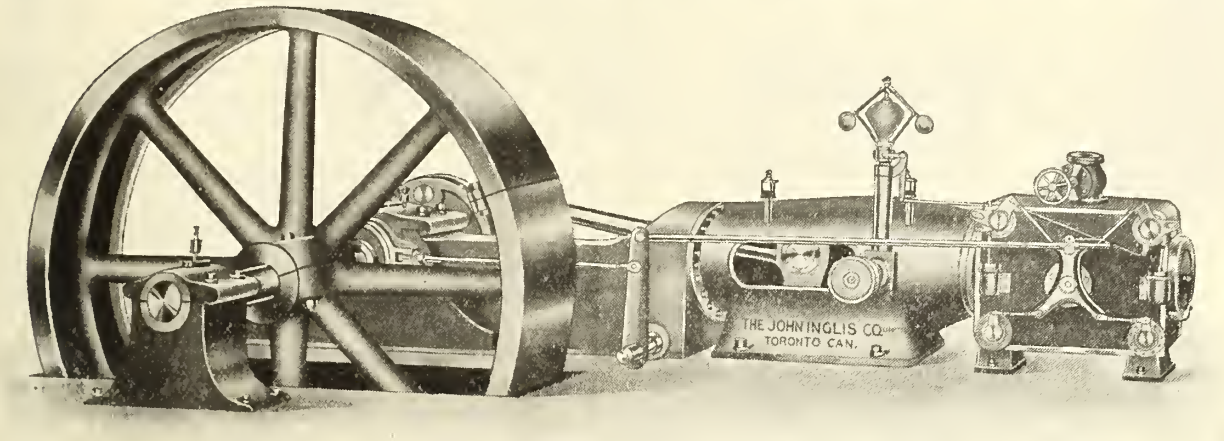
Joseph Fortier Limitee, has been incorporated with a capital stock of $100,000 to carry on business as paper manufacturers, dealers in pulp, paper, timber, lumber and all such products, with head office at Montreal, Que. The incorporators include R. P. Fortier, E. Lalonde, Jos. Fortier and J. W. Butler, all of Montreal, Que.

MacLean Daily Reports

The only systematic method yet devised for reporting BUILDING AND ENGINEERING projects from their inception to completion. Ask us for Rates and Specimen Reports.

220 King Street West - TORONTO

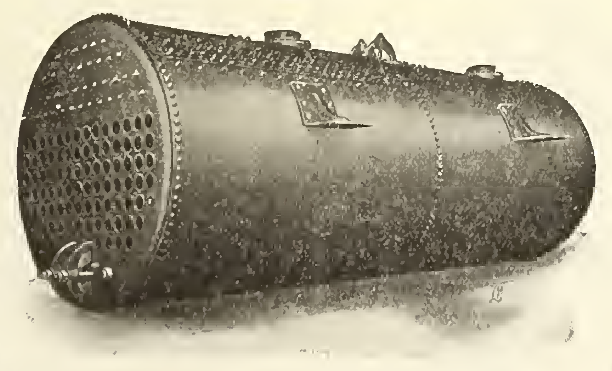
Corliss ENGINES



"Inglis" Corliss Engine

"Inglis" Corliss Engines are designed for continuous operation on heavy loads, with a minimum of attention and small repair Bills. The "man behind the throttle is kept in mind" and all parts are accessible.

BOILERS



"Inglis" Standard H. R. Tubular Boiler

WE MAKE BOILERS OF ALL KINDS **SEND US YOUR INQUIRIES**

The John Inglis Company Limited

Engineers and Boilermakers

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CATALOG?

It's a beauty, and the largest and best catalog of

Hoisting Machinery

ever published in Canada.

And why should it not be the Best Catalog, for does it not describe the Best Hoisting Machinery made in Canada?

This book also shows a splendid assortment of Derricks and Derrick Parts, Steel Buckets, Steel Skips and Steel Cars, and many other articles used in connection with Hoisting Machinery.

If you are interested in these goods drop us a line, so we may mail you one of these fine catalogues. You will not be sorry.

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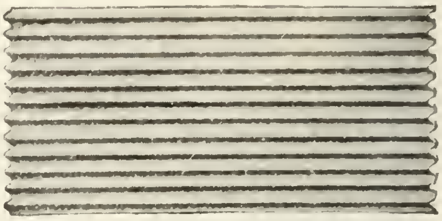
Belleville, Ont.
Makers of Hoisting Machinery
Sales Agents: MUSSENS Limited, Montreal

Corrugated Iron

BLACK, PAINTED OR GALVANIZED
Straight or Curved
Stock carried of all gauges, lengths up to 10 feet.

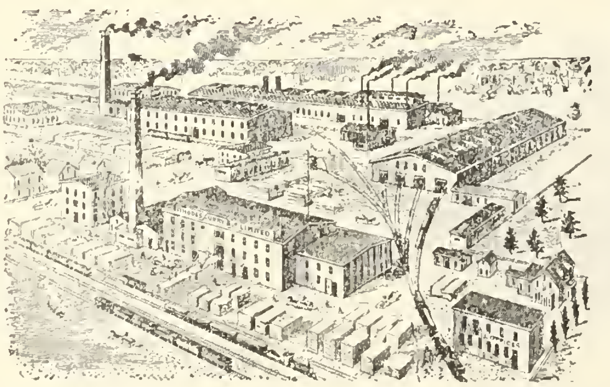


RIDGES FLASHINGS CLEATS BOLTS
and all other necessary sundries.
We Specialize on
Curved Sheets for Concrete Supports

The Metallic Roofing Co.
LIMITED
Manufacturers
TORONTO, ONT. WINNIPEG, MAN.
(33)

Rhodes, Curry Co., Limited

Lessees



Bank and Office Fittings

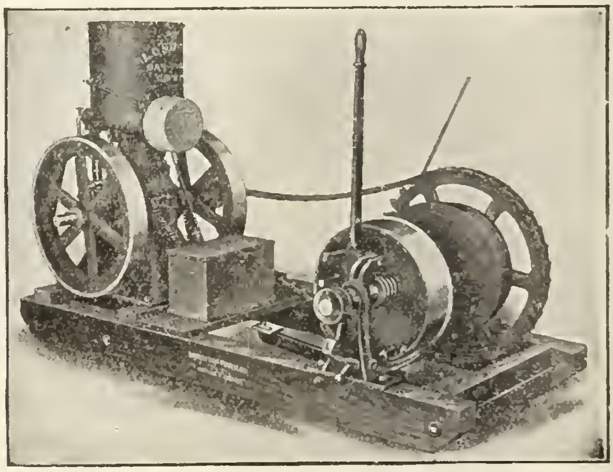
SCHOOL DESKS A SPECIALTY

We manufacture all kinds of building materials, including cast iron columns, cresting, sash weights, etc.

In addition to our large stock of native lumber, we are now carrying about one million feet of foreign lumber, including oak, walnut, ebony, whitewood, basswood, red cedar, Douglas fir, mahogany, &c.

Rhodes, Curry Co., Ltd. Amherst, N. S.
BRANCHES AT
Halifax Sydney

Do You Want a Good Hoist?



PATENT APPLIED FOR

"London" Friction Clutch Hoist

Here are a few of its many uses

Contractor's Work	**Mortar Conveying**	**Well Digging**
Bridge Building	**Sewer Building**	**Pile Driving**

This hoist can be used with any make or style of gas, gasoline or oil engine

The London Gas Power Co., Limited
Engineers and Machinists **London, Canada**

MODERN BUILDINGS
REQUIRE
MODERN ELEVATORS

We build both plunger and electric elevators with patented improvements to secure better control and operation

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THE JOHN McDOUGALL CALEDONIAN IRON WORKS CO.
LIMITED
WORKS: **512 WILLIAM STREET, MONTREAL**

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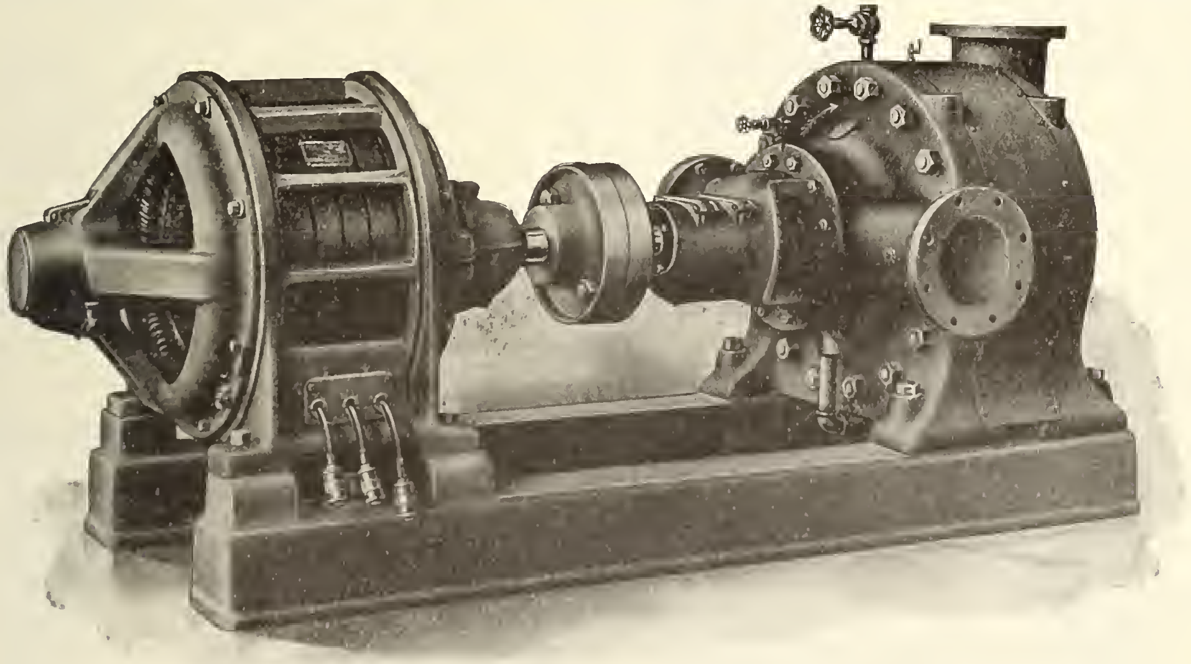
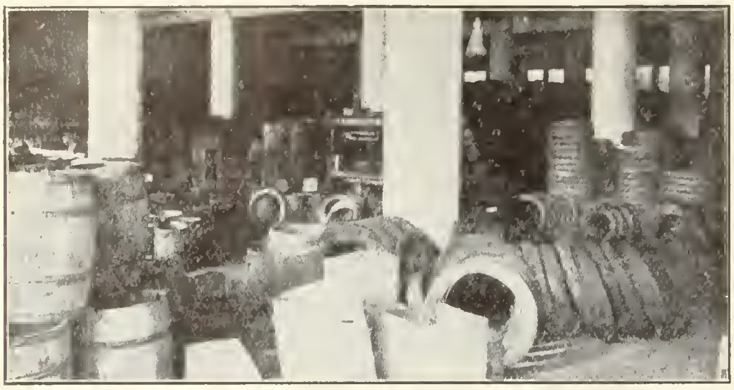
Electrically Operated Turbine Pumps for All Duties



CANADA FOUNDRY COMPANY, Limited
TORONTO MONTREAL HALIFAX OTTAWA COBALT WINNIPEG CALGARY VANCOUVER NELSON



Note tremendous metal weight on this floor. Entire building of Alsen's Cement reinforced concre

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
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ANOTHER TEST

Put on a wall two sheets of lath, one the ordinary kind and one of Herringbone. Mix your plaster too wet and without sufficient hair. By varying your mix you will easily find a plaster which will drop badly from the back of the ordinary lath but will not drop from the Herringbone.

Herringbone Lath gives the best key

CLARENCE W. NOBLE
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Metal Shingle and Siding Co., Manufacturers

Merriman One-Car Asphalt Plant

The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.

Many special features. Write for full particulars.

Also Asphalt Mixers
East Iron & Machine Company, Lima, O., U. S. A.

EVERYTHING YOU WANT

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Water, drains, sidewalks, gas, electric power, tramways, three railways, police and fire protection and all Montreal's facilities

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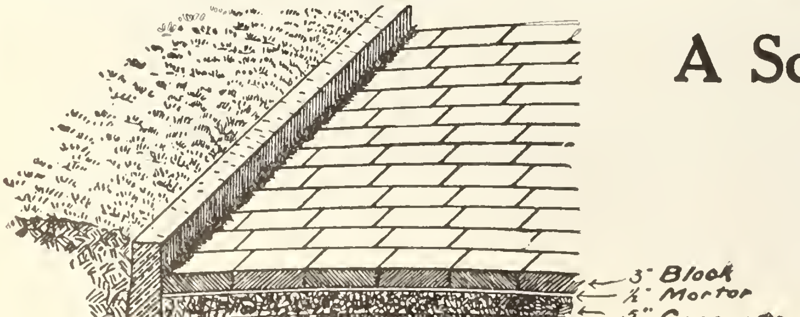

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Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
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**Used by the Largest Mining Companies and Hydro-Electric Plants.
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Sizes 3 to 42″ Diameter up to ¼″ in thickness
Easily installed and securely connected with our Forged Steel Flanges or All Steel Bolted Joints.

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NEW YORK OFFICE—50 Church Street

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Limited

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BAY STATE
BRICK AND CEMENT COATING

The coating prevents discoloration or cracking from moisture and does not destroy the pleasing texture of the concrete or stucco. It has been endorsed by the National Board of Fire Underwriters as a fire retarder and is a perfect protection as well as a beautiful tint for the exteriors or interiors of residences, hotels, garages, factories and mills.
ON FLOORS it stands wear and washing and does not disintegrate.
Let us send you a book which tells all about it and a list of the well known homes, hotels, mills and factories on which it has been used.
Address, mentioning this medium.

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A few dollars spent in advertising your proposals in

The Contract Record

would result in additional competition, which might save your city or town or your client many hundreds of dollars.

The Des Moines Hemispherical Bottom Steel Tanks and Towers

have been used and approved by nearly all leading Engineers. They are undoubtedly the most economical means of storing water at an elevation.
We have built many of these in Canada the United States and Mexico.
Estimates cheerfully furnished.

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F. H. Hopkins & Company, Canadian Representatives, Montreal, Quebec

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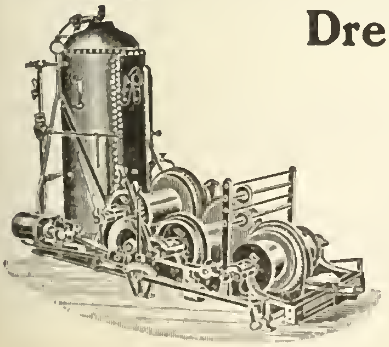
M. Beatty & Sons, Limited

Welland, Ontario, Canada



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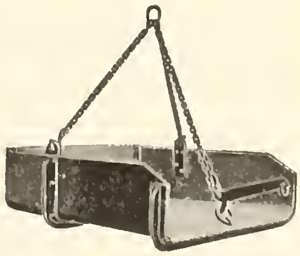
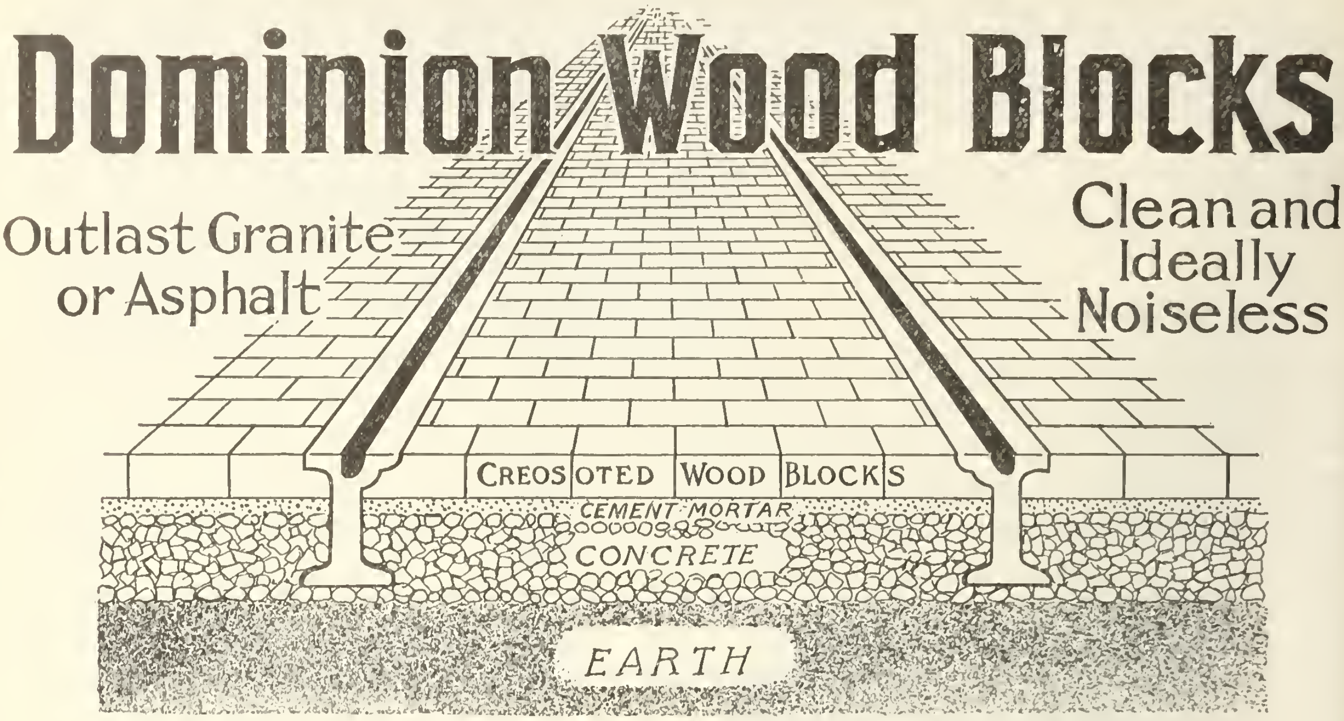
Steel Dump and Deck Scows
Submarine Rock Drilling Machinery
Mine Hoists, Hoisting Engines
Centrifugal Pumps, Clam Buckets
Steel Skips, Coal and Concrete Tubs
and other Contractors' Machinery





The Proof of the Pudding

May be in the eating; which seems also to suggest ease of early dissolution. The exact reverse applies to the PROOF OF A

Permanent Pavement

One that requires the constant attention of the Repair Gang to prevent its break-up and ruin could not be said to have proven satisfactory. Yet the Repair Gang seems to be an essential feature of Patent Pavements. ¶ How often have you seen the **Creosoted Wood Blocks, The Wood Eternal,** being PROVED IN THE PUDDING MANNER? ¶ Dominion Creosoted Wood Paving Blocks are cut from the log of live Douglas Fir in our own mills.

The Mullen Combination Tar Kettle and Gravel Heater

A Money Maker for Contractors

Is on wheels and can be easily moved about. Supplies hot gravel and hot tar from the one fire.

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HOBOKEN, N. J., U. S. A.

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- Hydrated Lime
- Portland Cement
- Atlas White Cement
- Keenes Cement
- Waterproofing Cement
- Fire Brick
- Soot Doors
- Hard Wall Plaster
- Sackett's Plaster Board
- Parker's Corner Bead
- Plaster Paris
- Plasterers' Hair
- Iron Staunchions
- Mortar Colors
- Weeping Tile
- Sewer Pipe

We can make immediate delivery of any of the above materials from any one of our branch yards. Would be pleased to have your order.

The Waterous DOUBLE CYLINDER Road Roller

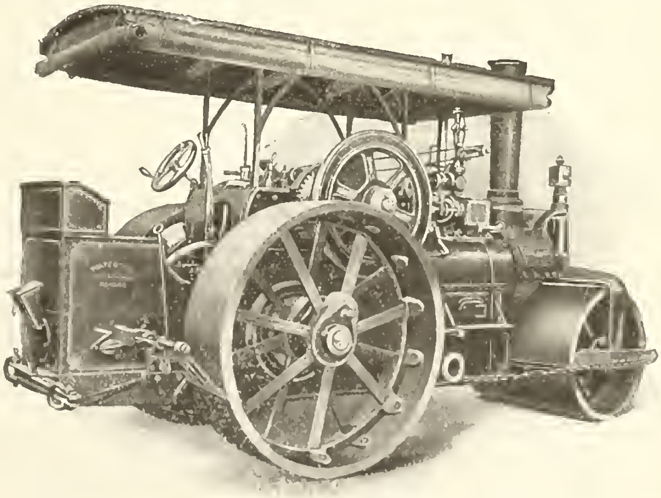
Waterous Double Cylinder Rollers can be used on any kind of road work. Over 130 have been sold in Canada. They have made good wherever used.

The Waterous Roller is built in 10, 12 and 15 ton sizes which can be supplied from stock.

Its special features in which it differs from other rollers on the Canadian market are:—Double Cylinder, Double Crank Engine, high pressure, locomotive type boiler; rocking grates: dumping ashpan; two speed forward and reverse motion with all gears cut from solid steel.

It is further provided with Universal Joint steel yoke, wear proof rolls, improved spring roll scrapers, has attachments for driving rock crusher and has front clevice and rear draw bar for hauling plow or road material.

Fully described in bulletin No. 301.



When you see a Waterous Roller at work, ask the man in charge what he thinks of the machine.

The Waterous Engine Works Co., Limited
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Who tender the bond of the

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THE LARGEST SURETY COMPANY IN THE WORLD

will have a **Distinct Advantage** in bidding for work.

Owners are now insisting on . . **ABSOLUTE SECURITY** for the performance of contracts . .

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Canada's Pioneer and Leading Concern in the Marble Business

They will sell you Quarry Blocks, Sawn Marble, Marble completely finished for either interior or exterior purposes, and, if necessary, they will contract to set it in place.

Samples may be seen at District Sales Offices:—

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General Contractors Supply Company, Ltd.	Halifax, N. S.
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James Robertson Co. Ltd.	St. John, N. B.
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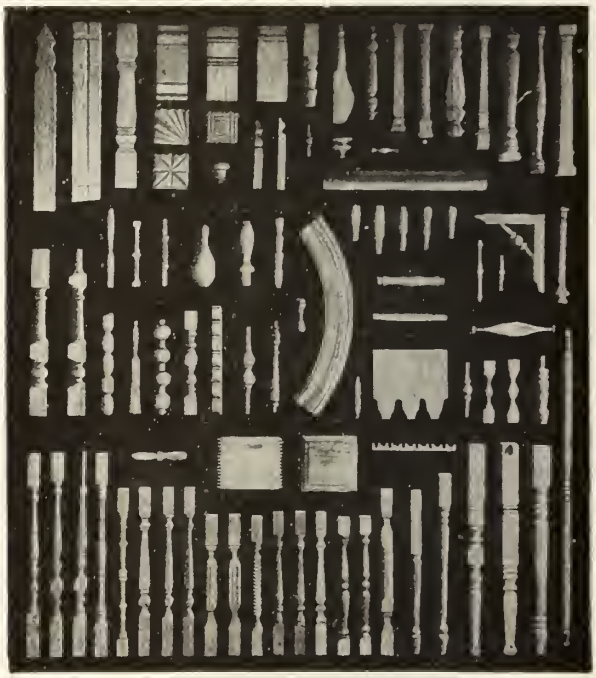
The Ritchie Contracting & Supply Co. Ltd.	Vancouver, B. C.
315 Coristine Building	Montreal, Que.



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Automatic Wood Box and Turning Co.

Office and Factory : ETCHEMIN, LEVIS, QUE.

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Steel Sash

Hyrib, Rib Bars, Rib Metal.

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KAHN SYSTEM Reinforced Concrete

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Branches everywhere

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It is a good investment to BUILD RIGHT.

No COST FOR MAINTENANCE if you use our Enameled Brick.

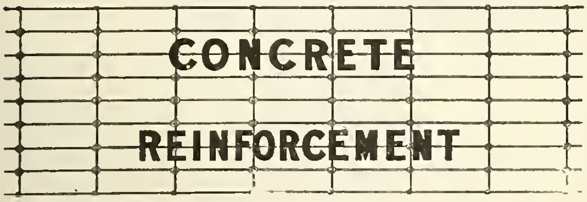
AMERICAN ENAMELED BRICK & TILE CO.
1182 Broadway, New York City

1 1-2 Times as Strong as Bar

Page Flat Wire Reinforcement

solves the problem of quick laying, contouring, proper tamping, perfect setting of concrete spans, and the easy preparation of column reinforcement.

Sheets are in flat units of any length. Bonding area is 27.7528 lineal inches per sq. inch of section, against 3.5343 and 4.0 ins. for round and square bar.



Tensile strength is one and a half that of steel bar, allowing equal strength with two-thirds the weight of reinforcing, and nearly **six** times the bonding area for increased safety, compared with bar steel.

Write us about this new and convenient form of reinforcement. It saves labor. Betters construction. Insures perfect bonding. Sample free.

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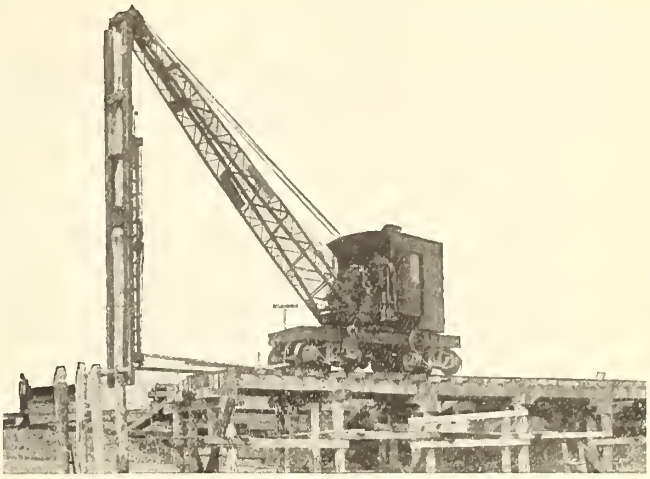

Driving Piles with a
BROWNHOIST LOCOMOTIVE CRANE

The contractor himself made this device for driving piles with the crane. It was used on the N. Y., C. & St. L. R. R. The piles were 40 ft. long and driven 20 ft.

This is only one of the many uses of a Brownhoist locomotive crane on construction work. It is being used today for excavating, depositing concrete, handling sand, gravel, stone and heavy construction work, and switching the cars.

Our new illustrated catalog shows these operations on some of the largest construction work today.

Write for it, now.

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It means the best Architectural Terra Cotta ever made.

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REDS--BUFF--STONE--GREY

and all Colors, Glazed and Unglazed

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Needs inside work at this time of the year.

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Metal Ceiling and Side Wall

The work is there for the contractor that goes after it.

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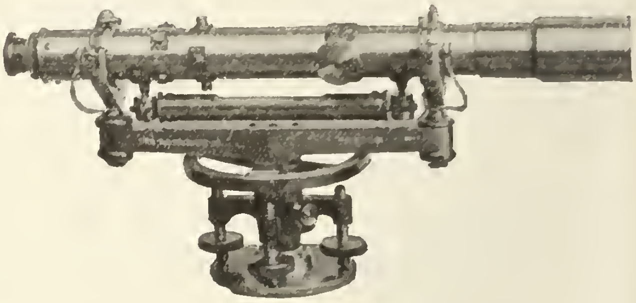

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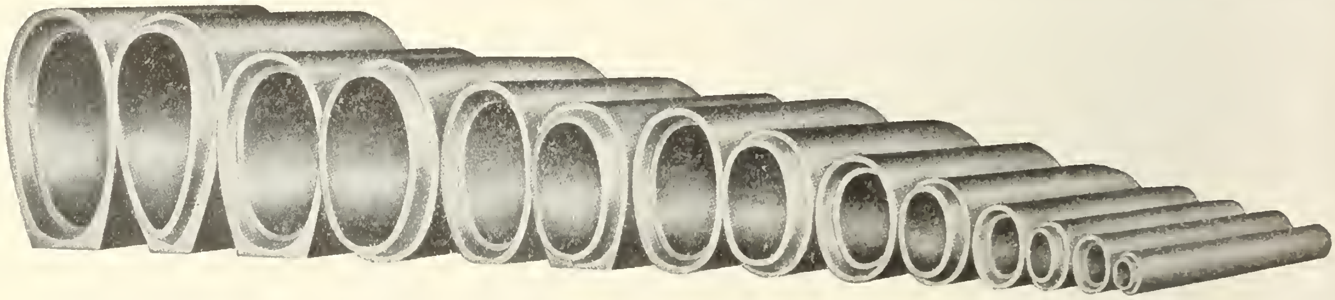

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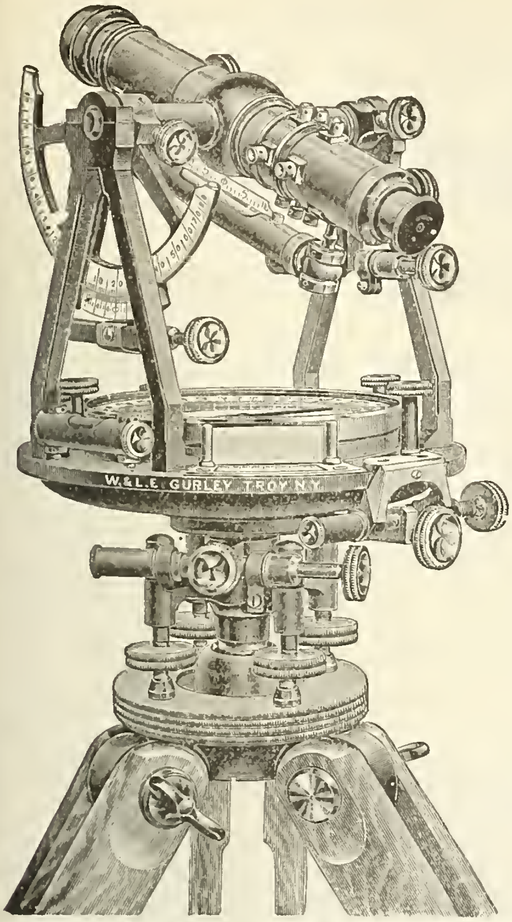
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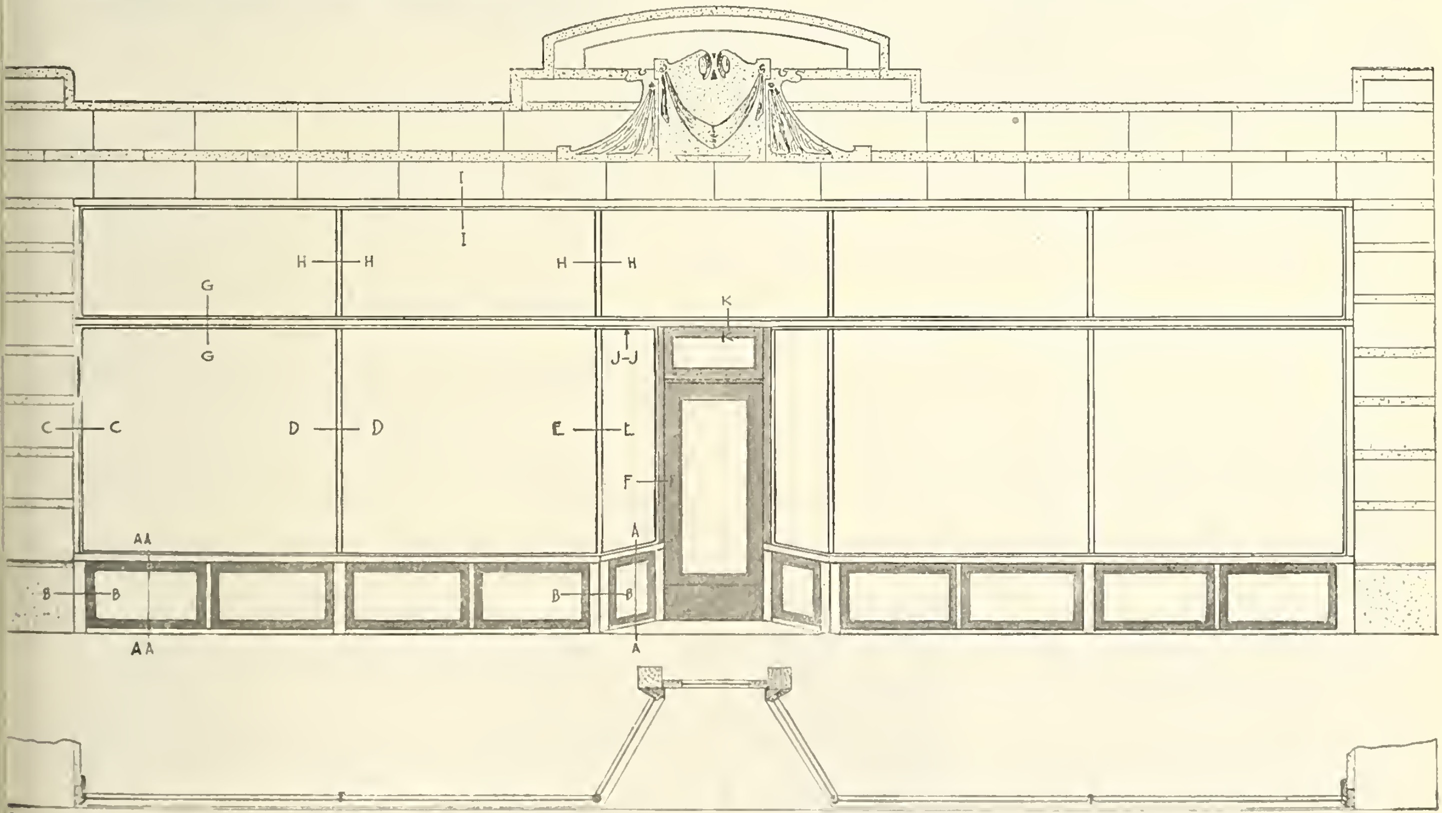

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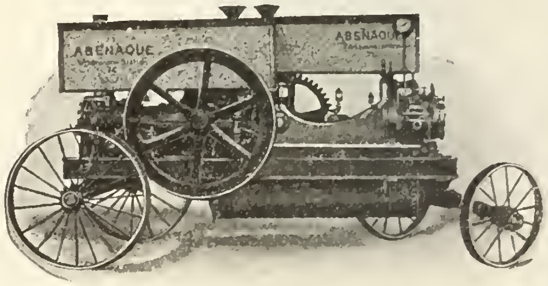

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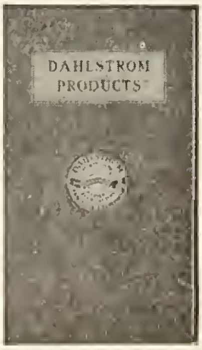
costs but $12.00 per day to operate and saves the labor of 30 men. It is a money saver for every contractor using it. Let us show you where you can save money on your contract. **Write for Catalogue "M".**

Abenaque Machine Works
Westminster Station, Vt.

The Dahlstrom Products

A little booklet explaining many interesting features concerning the origination and perfecting of "steel interiors." It is agreed by authorities and proven by many actual and severe tests that no matter what precautions you take to fireproof a building, the structure is not nor cannot be "fireproof in reality" if inflammable trim is used, which permits the fire to spread from room to room and floor to floor.

Get a copy of this booklet. The information contained therein is both interesting and valuable. It is a concise story of The Dahlstrom Products and What They Are. Free for the asking.



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Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per B
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches........	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 '	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.50	$ 6.75	$ 5.25
40 u. i.	4.25	3.75	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11,50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts —Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 per cent.

No. 4 compression bath cock .... net $1.75

No. 4½ Fuller's .... net $2.35

Square head brass cocks, 65; iron, 65 per cent.

Boilers—Galvanized Iron Range

30-gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5¼ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)	Black.		Galvanized
¼ inch	1.80	¼ inch	2.57
⅜ "	1.80	⅜ "	2.57
½ "	2.35	½ "	3.23
¾ "	2.75	¾ "	3.83
1 "	3.93	1 "	5.48
1¼ "	5.35	1¼ "	7.49
1½ "	6.44	1½ "	8.98
2 "	8.05	2 "	11.46
2½ "	12.85	2½ "	18.30
3 "	16.86	3 "	24.03
3½ "	22.57	3½ "	33.65
4 "	25.65	4 "	35.90

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-inch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

Crushed stone, 2-inch, $1.30; 1-inch, $1.30; ⅜-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and leads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $3.00.

Manilla Rope, best, per pound, 16½ cents.

PAINTS AND OILS

(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $6.75 to $7.00 per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, 99c. per gallon of 9 lbs.

Raw Linseed Oil, in barrels, 96c. per gallon of 9 lbs.

Turpentine, in barrels, 73c. per gallon.

Pure Red Lead, dry, $5.50 to $6.50 per 100 lbs.

Business Notes

Listowel, Ont.

Dry goods store on Main street, belonging to H. S. Alexander burned; $15,000 damage.

Medicine Hat, Alta.

The Alberta Clay Products Company are not constructing a plant in Vancouver, B.C. The item published to that effect was incorrect.

Regina, Sask.

Regina is in market for one 85-ft. motor aerial ladder truck, $13,000; one motor chemical and hose wagon $6,500; one combination wagon, horse drawn, $1,600; one hook and ladder truck $2,000. hose, nozzles, ladders, etc., $5,000. City Commissioner, A. J. McPherson.

Winnipeg, Man.

Office and warehouse of Gowans Kent Western Limited, 358 Main street. Manager, F. S. Parlee, 42 Dundurn Place. Part occupants, Mason Risch Piano Co., Building and stock destroyed; loss $75,000.

McMYLER DERRICKS FOR SALE

Locomotive cranes, clam shell buckets, hoisting engines, steam shovel, pile driver, steam hammer, diving suits, stiff leg derricks, turnover buckets, two (2) marine engines, boilers, fuel lighter with whirley aboard. Address

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The WEEKLY FINANCIAL, COMMERCIAL & GENERAL TRADE NEWSPAPER of the GREAT WEST
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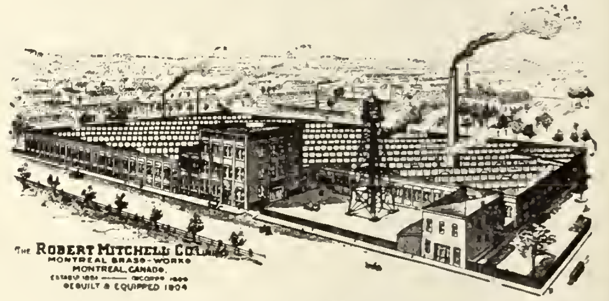

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The man who knows a good thing when he sees it, and who wants a good thing when he hears of it, is the man who will insist upon having

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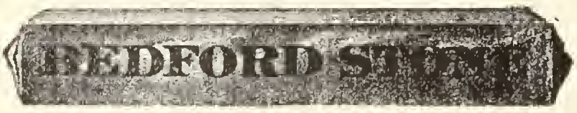

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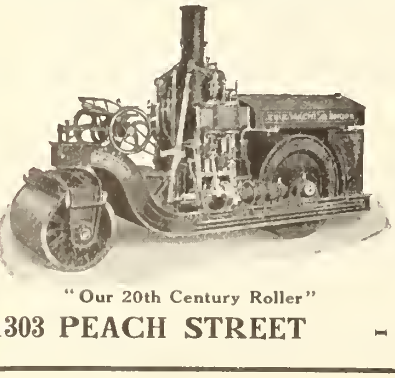

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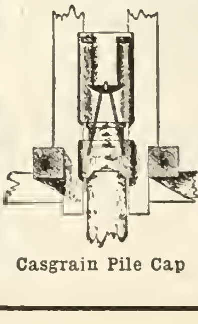

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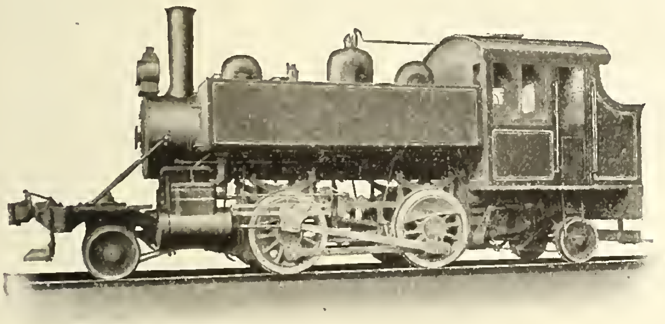

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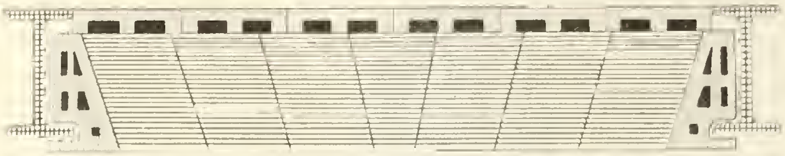

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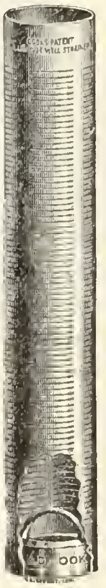

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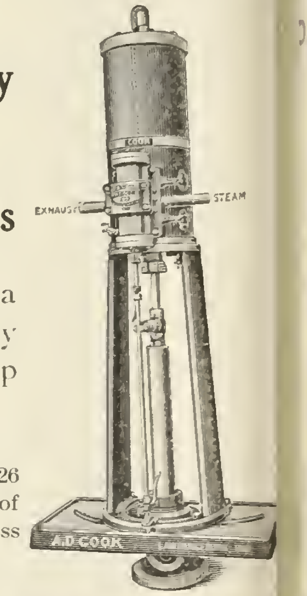

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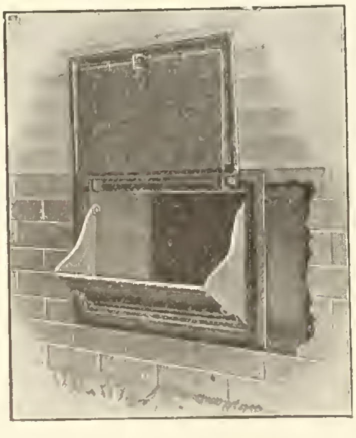

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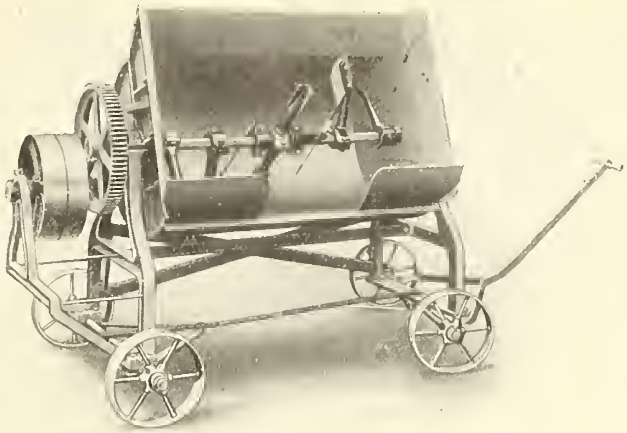

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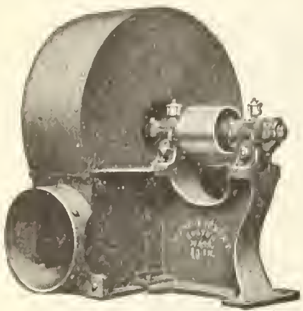

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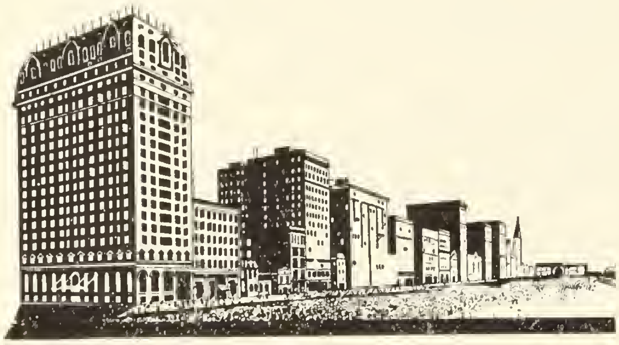

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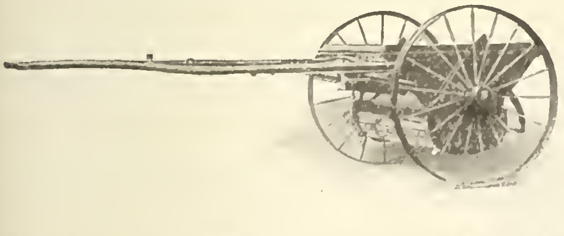

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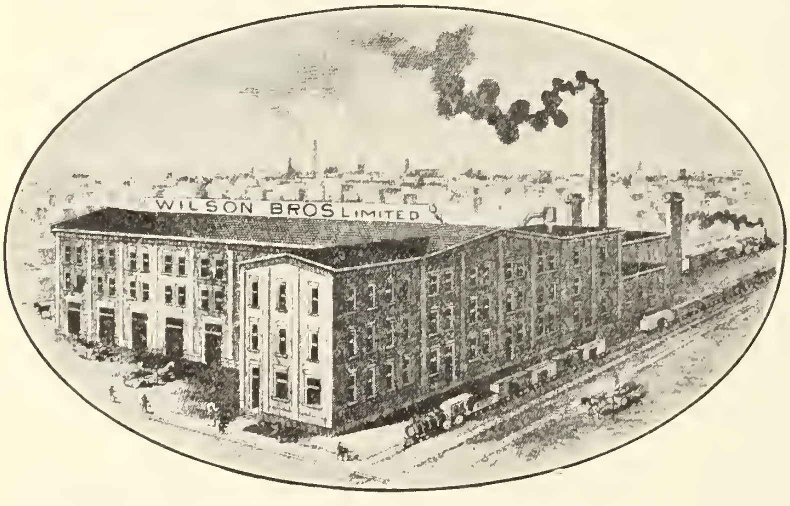

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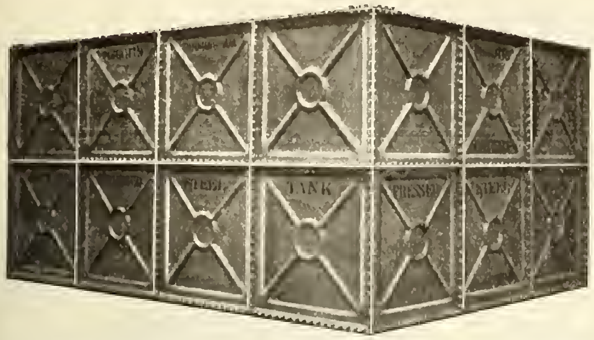

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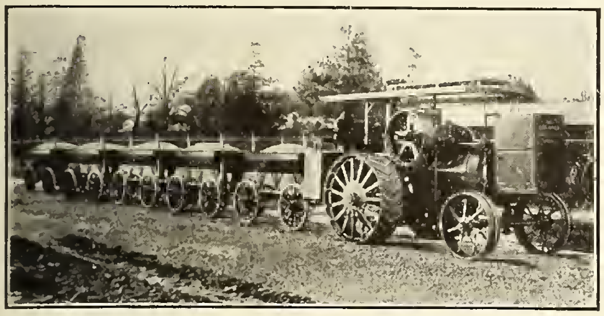

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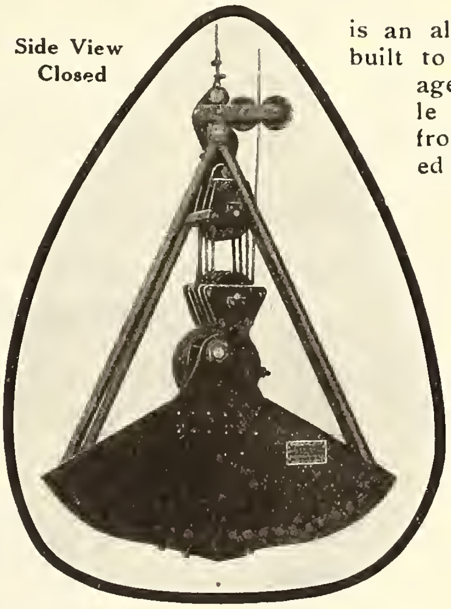

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Galvanized Wire Wound and Continuous Stave Wooden Pipe

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WILL NOT
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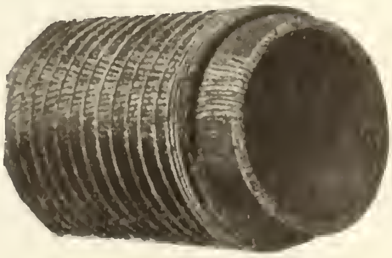

Withstands 200 lbs. Working Pressure
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Tanks, Water Works Supplies, Complete Water Systems Installed

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The Mushroom System

Of Reinforced Concrete is strong, economical and durable. Based on scientific principles, every pound of steel does the work it is designed to do.

The system is fully covered by broad patents in Canada, the United States, and all civilized foreign countries.

For lists of buildings, descriptive literature and estimates, address

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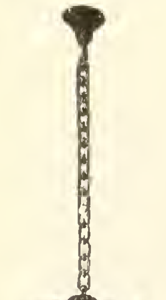

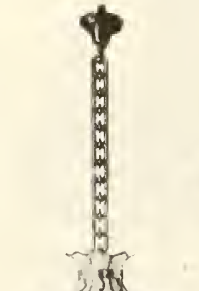

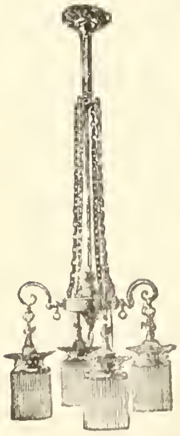

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10 to 20 % Discount During March

Builders, home owners and architects are realizing as never before the need of a uniform system in home and building illumination, straight gas or combination gas and electric fixtures are now looked upon as the ideal We want every person interested in home building to consult us about this question. Don't wait until you're sorry.

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12-14 ADELAIDE ST. WEST **Phone Main 1933**

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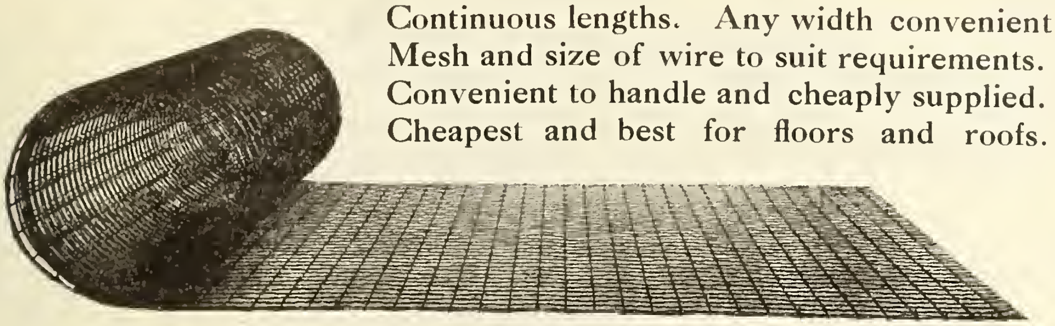


Continuous lengths. Any width convenient to handle.
Mesh and size of wire to suit requirements.
Convenient to handle and cheaply supplied.
Cheapest and best for floors and roofs.

WRITE FOR CATALOGUE No. 5.

Wire Rope **Wire Lath**

MANUFACTURED BY

The B. Greening Wire Co. Limited

HAMILTON, Ont. - MONTREAL, Que.

Flooded with Light by LUXFER PRISMS

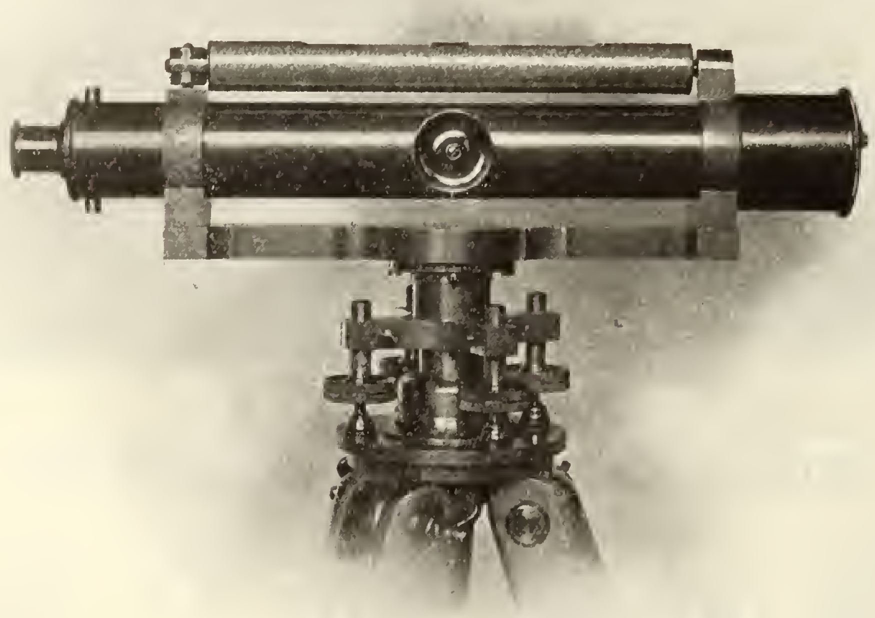
The transom of this store is of Luxfer window Prisms.

The ceiling has a large area glazed with Luxfer Prisms and the canopy was designed and erected by us.

The result is one of the most attractive store-fronts in town and a brilliantly lighted interior.

Always Specify LUXFER PRISMS

Luxfer Prism Co.
Limited
100 King Street West, Toronto



The Consol Level

For exactness in construction and superiority of the working and optical parts, the Consol Level meets all requirements.

Our many years experience as manufacturers of Scientific Optical Instruments gives us exceptional training and facilities for designing and constructing Transits and Levels of high order.

Consol Instruments are made in our Factory at 400 Richmond Street West, Toronto by the most skilled instrument makers we can procure.

The entire instruments and their optical parts are built up here from raw material, no imported parts being used, reducing their cost by the amount of the duty paid on Imported Instruments.

We give you a Canadian Instrument at a Canadian price because

WE SAVE THE DUTY

An invitation is extended to those interested to visit our Factory, where Scientific Instruments and Lenses in all stages of manufacture may be examined.

Write for Illustrations of our Instruments.

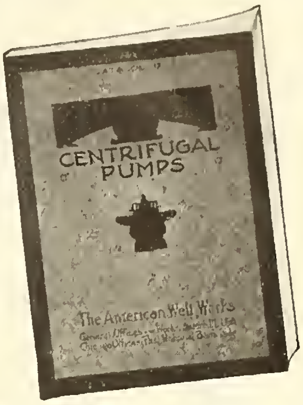
Consolidated Optical Co., Limited, Toronto

MONTREAL WINNIPEG CALGARY VANCOUVER

Why "American" Centrifugals

Are Most Economical in the Widest Range of Pumping Conditions.

The reason why "American" Centrifugals are unequalled for economy is that they represent the highest development of the most modern type of pump and there are the best of reasons for this higher development.



Instead of building a single type of centrifugal and recommending it for every purpose "American" centrifugals are built in over fifty distinct types and every size of every type is carefully tested in our own complete hydraulical laboratory and its efficiency proved before it is permitted to leave our works.

It must meet our standard of efficiency before it is allowed to leave our works and that is what is making the American trademark famous in pumping machinery.

AMERICAN

"American" centrifugals attain up to 80 per cent. mechanical efficiencies and many of our specially designed pumps, installed according to our own specifications, show much higher efficiencies, enabling them to operate against high heads. We have many single stage centrifugals installed operating on over 200 feet heads.

The low first cost of "American" centrifugals as compared with old style plunger pumps, combined with their high efficiencies, low cost for attendance and small cost for repairs make them **far more economical** than any other type of pump in nearly all conditions where **all costs are considered.**

Greatest economy in the end is the claim we make for "American" centrifugals and we are ready to prove that claim.

If you are interested in irrigation, write for our booklet, "Irrigation by Pumping" Bulletin No. 118.

Our General Centrifugal Pump Catalog No. 117 is the most complete ever issued. Write for it today.

The American Well Works

General Office and Works: Aurora, Ill., U. S. A.
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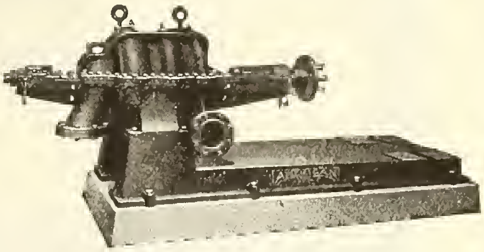

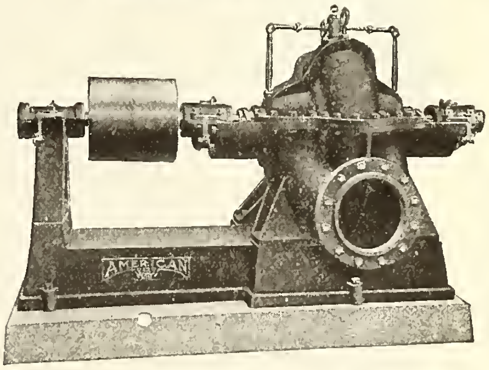

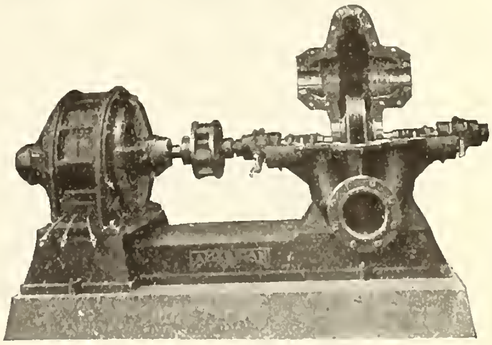

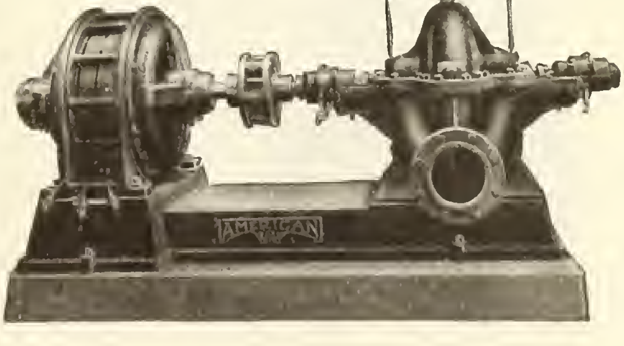

KERR

We are specialists in the design and manufacture of valves and hydrants for waterworks systems.

"KERR" are known from coast to coast for the reliable service they always give.

If your municipality are contemplating waterworks extension send us a list of your requirements and let us quote you.

Always Specify "KERR."

THE KERR ENGINE CO. LIMITED
VALVE AND HYDRANT MANUFACTURERS
WALKERVILLE, ONT.

Batts Limited

West Toronto

PHONES	OFFICE and MILL
Junction 568-569	368-388 Pacific Ave.

DESIGN B. L. NO. 3

Length	Diameter—5-in.	6-in.	8-in.	10-in.	12-in.
4 feet Price......	$2.10	$2.20	$3.00	$4 70	$6.75
5 feet Price......	2.40	2.55	3.20	5.50	7.30
6 feet Price......	2.70	2.80	3.35	5.80	7 60
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9 feet Price......	..	..	4.55	8.25	9.50
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Staved Columns
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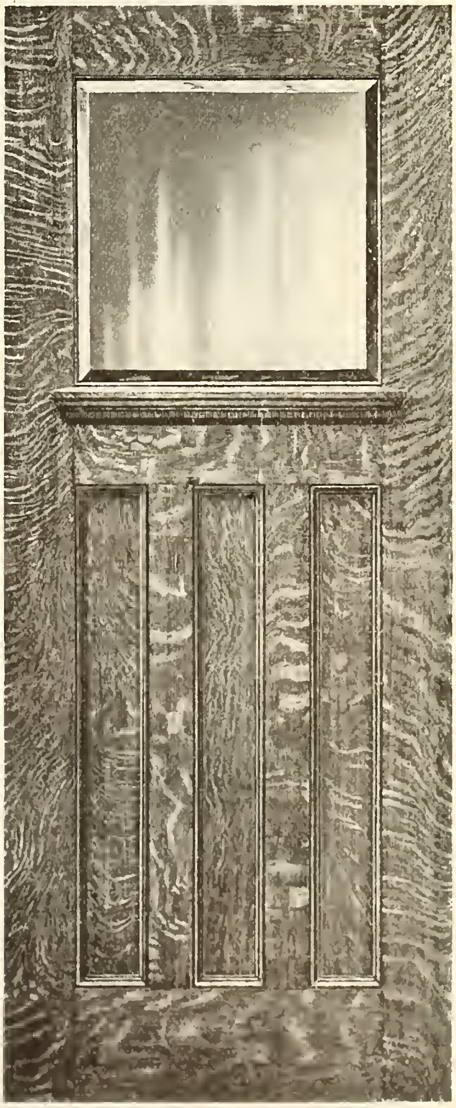
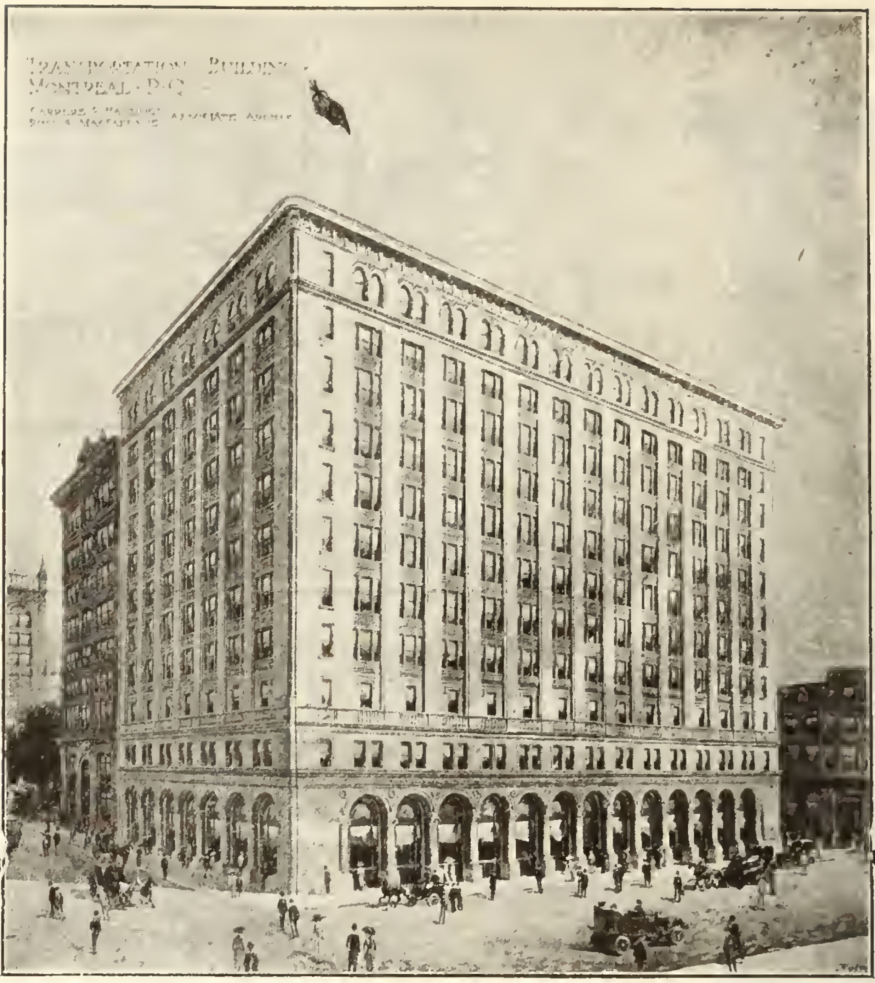


B. L. NO. 311, ¼-CUT OAK

Sizes in Stock		¼-Cut Oak	Pine
2 ft. 8 in. x 6 ft. 8 in. —1¾ in.	Price..	$8.50	$4.00
2 ft. 10 in. x 6 ft. 10 in.—1¾ in.	Price..	8.50	4.25
3 ft. 0 in. x 7 ft. 0 in. 1¾ in.	Price..	9.00	4.50



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Galvanized Expanded Metal Lath and Corner Beads Used Exclusively

The PEDLAR PEOPLE LIMITED

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TRADE ADANAC MARK

Solid, Stranded or Flexible Conductors

in Single or Multiple Rubber insulated with or without Lead Sheath.

Imperial Wire & Cable Company Limited, Montreal

THE NORTHERN ELECTRIC & MANUFACTURING CO., Limited

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Albert Works: PRESTON, ENGLAND

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CLAY WORKING PLANT

for all classes of Clays and Shales.

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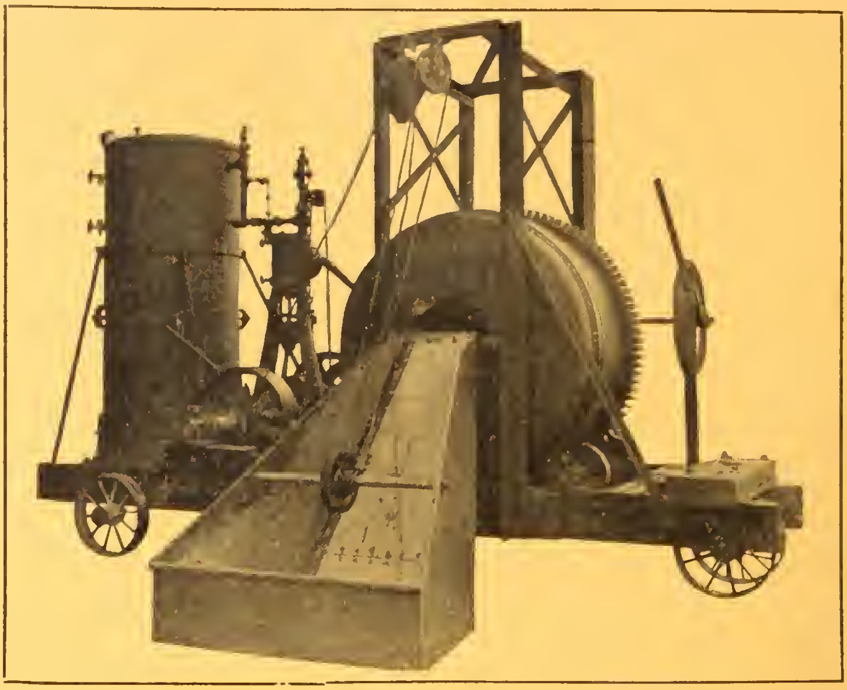

WHY should you buy a RANSOME?

When buying a Concrete Mixer

Its not the first cost

But the ultimate cost that counts

You can undoubtedly find many concrete mixers whose first cost is less than the Ransome—but is their ultimate cost less? That's the point.

You cannot afford to buy a machine that is not always reliable, is not satisfactory in operation, is inefficient.

Our Ransome Mixer is the most reliable, efficient and durable mixer on the market. Simple in construction—repair bills are practically nil.

Considering quality and real value in Concrete Mixers—there is no cheaper machine on the market. All sizes in stock.

F. H. Hopkins & Co.

MONTREAL

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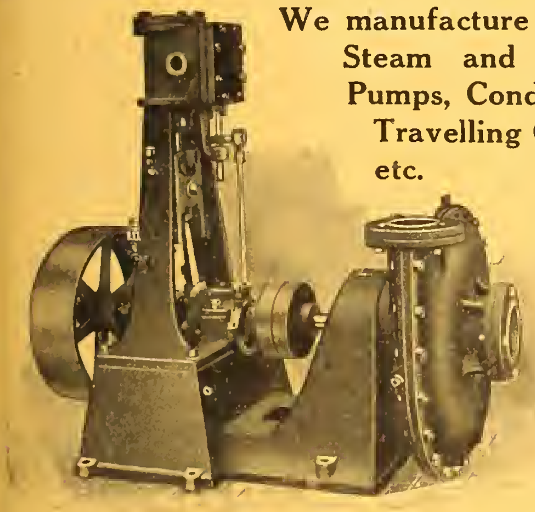
Vol. 26 Toronto, March 20, 1912 No. 12

ESTABLISHED 1886

Contract Record and Engineering Review



We manufacture Steam and Power Pumps, Condensers, Travelling Cranes, etc.

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The Smart-Turner Machine Company Limited
HAMILTON, ONTARIO

"MADE IN CANADA"

Bent Glass

Made in all Kinds of Glass on Short Notice

Large Bent Plate Glass for Shop Fronts a Specialty

The Toronto Plate Glass Importing Company, Limited
(HILL & RUTHERFORD, Managing Directors)
Head Office and Works : 91 to 133 Don Roadway
TORONTO

Earning Power
is based on a machine's operative ability, not on its initial cost.

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COMPRESSORS ROCK DRILLS

Canadian RAND Co. Limited
Commercial Union Bldg., MONTREAL, CAN.

Continuous and Machine Banded Wood Stave

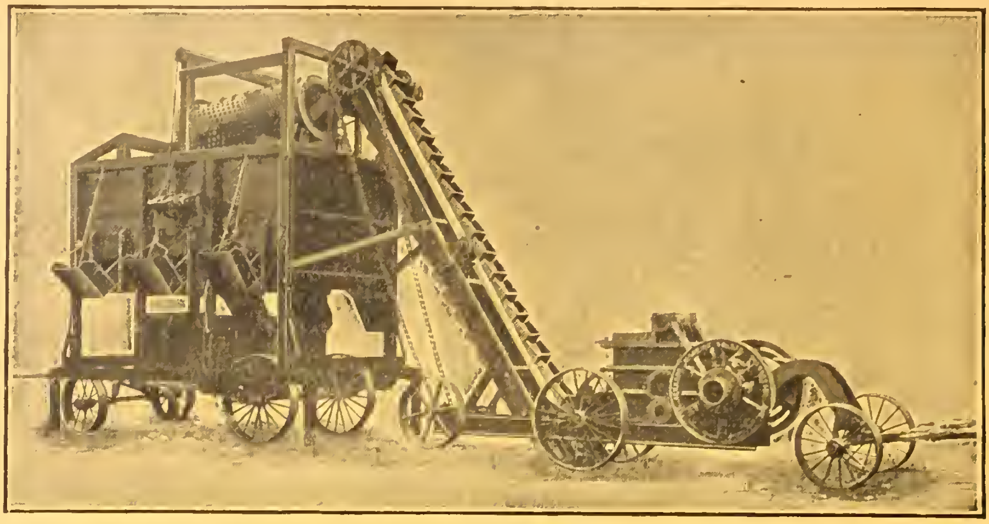
WATER PIPE

RESERVOIR TANKS

for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

Pacific Coast Pipe Co., Limited
P. O. Box 563 Vancouver, B. C.
Office and Factory, Granville St., near High Bridge
WRITE FOR CATALOGUE
Full Particulars and Estimates Furnished

lphabetical Index of Advertisers, Page 16 Classified Directory to Advertisements, Page 6



Capacity 150 tons in 10 hours.

Size of Crusher 9" x 16. Will crush to 1½".

Complete Crushing Plants

including

Portable Boiler and Engine

This cut reproduced from a photograph will give one a good idea of a neat and compact plant.

We have been in the crusher business for years, and our past experience is at your disposal.

The Jenckes Machine Co., Limited

General Offices: Sherbrooke, Que.

Works: Sherbrooke, Que. St. Catharines, Ont.

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"AMERICAN"

STEAM AND ELECTRIC HOISTS TIMBER AND STEEL DERRICKS

OF ALL CAPACITIES

"The 'AMERICAN' Derrick Engine purchased from you 11 years ago has been the most satisfactory piece of machinery I have ever owned.

"It has been in constant daily use with less than 10 dollars' worth of repairs.

"W. G. LARUE, Duluth, Minn."

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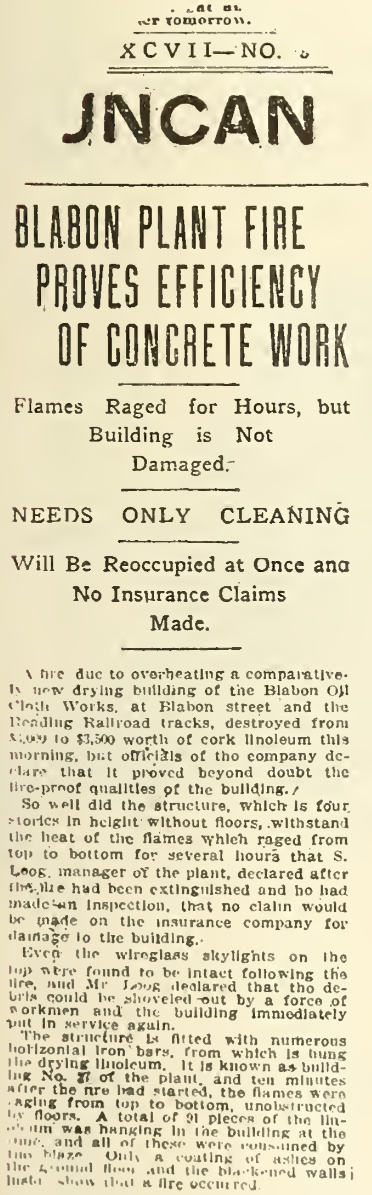
American Hoist & Derrick Co., St. Paul, U.S.A.

Gorman, Clancey & Grindley, Edmonton and Calgary, Alta, and Nelson, B.C.
Vancouver Machinery Depot, Ltd., Vancouver, B.C.
Stuart Machinery Co., Winnipeg, Man.

Name ....
Address .... State
Please send prices and information on "AMERICAN" whether Engines, Derricks, etc.
AMERICAN HOIST & DERRICK CO.
St. Paul, Minn.
C.R.

An Unsolicited Testimonial in Support of This Book—



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[illegible] tomorrow.

XCVII—NO. [illegible]

JNCAN

BLABON PLANT FIRE
PROVES EFFICIENCY
OF CONCRETE WORK

Flames Raged for Hours, but Building is Not Damaged.

NEEDS ONLY CLEANING

Will Be Reoccupied at Once ana No Insurance Claims Made.

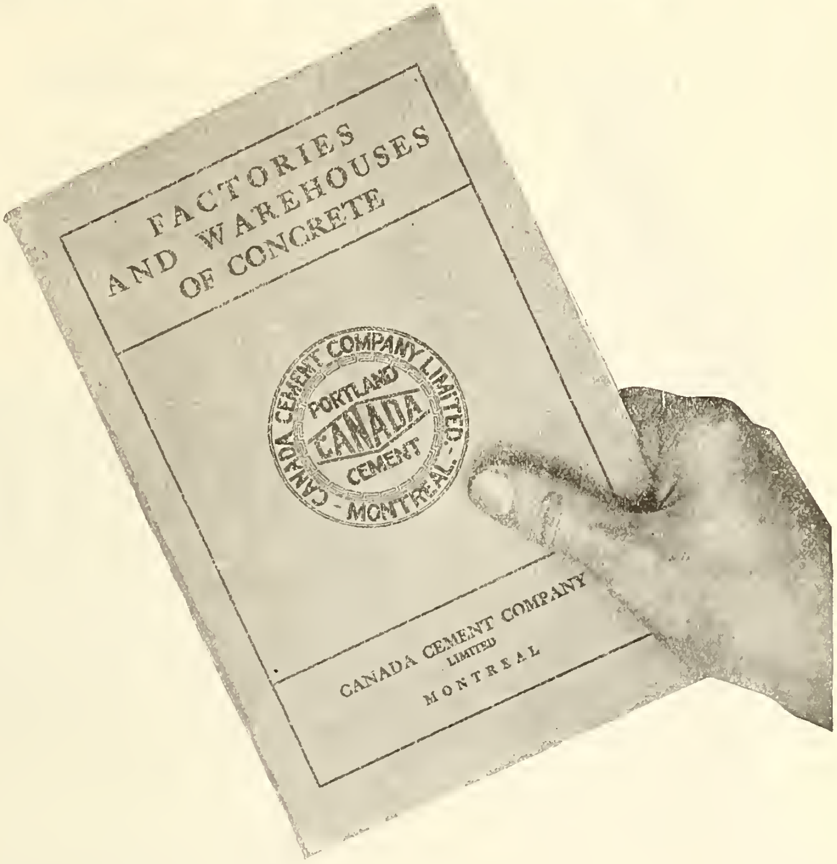
A fire due to overheating a comparatively new drying building of the Blabon Oil Cloth Works, at Blabon street and the Reading Railroad tracks, destroyed from $3,000 to $3,500 worth of cork linoleum this morning, but officials of tho company declare that it proved beyond doubt the fire-proof qualities of the building.

So well did the structure, which is four stories in height without floors, withstand the heat of the flames which raged from top to bottom for several hours that S. Loog, manager of the plant, declared after the blaze had been extinguished and he had made an inspection, that no claim would be made on the insurance company for damage to the building.

Even the wireglass skylights on the top were found to be intact following the fire, and Mr Loog declared that tho debris could be shoveled out by a force of workmen and the building immediately put in service again.

The structure is fitted with numerous horizontal iron bars, from which is hung the drying linoleum. It is known as building No. 37 of the plant, and ten minutes after the fire had started, the flames were raging from top to bottom, unobstructed by floors. A total of 91 pieces of the linoleum was hanging in the building at the time, and all of these were consumed by the blaze. Only a coating of ashes on the ground floor and the blackened walls inside show that a fire occurred.

The article reproduced above appeared as a news item on the first page of the Philadelphia Evening Telegraph, issue February 3rd, 1912. Could there be more striking proof of the value of reinforced concrete fireproof construction.


FACTORIES AND WAREHOUSES OF CONCRETE
CANADA CEMENT COMPANY LIMITED - MONTREAL -
PORTLAND CANADA CEMENT
CANADA CEMENT COMPANY LIMITED MONTREAL

"FACTORIES and Warehouses of Concrete" is the title of this new book which we are distributing to the architects, contractors, engineers, and manufacturers of Canada.

It is the most comprehensive work on the subject of modern fireproof factory and warehouse construction ever written. It contains actual photographs of two hundred and thirty buildings, covering a wide range of architectural types—full data on each building, giving the cost per square foot, per cubic foot, window area, loading, insurance, etc.,—and fac-simile letters from manufacturers occupying these buildings, telling of their **experience** with concrete factories.

There is also an authoritative general discussion of re-inforced concrete construction—which every man interested in building will find valuable and instructive.

No architect, contractor, engineer, or manufacturer can afford to be without this book.

It will be mailed to any business man who asks for it, enclosing twelve cents in stamps to pay postage.

Address:

CANADA CEMENT CO., LIMITED
No. 61 National Bank Building, MONTREAL

Mixer Efficiency

You want the mixer that is reliable.

When you get this reliability, as you understand it in connection with concrete mixers, you have a machine that is a thorough mixer, a speedy worker and durable all through.

All these qualities are combined in

SMITH
CONCRETE
MIXERS

That is why they lead all others.

Smith Mixers 8 and 10 years old still in use today.

Montreal, 318 St. James St.
Toronto, 73 Victoria St.
Cobalt, opp. Right of Way Mine.

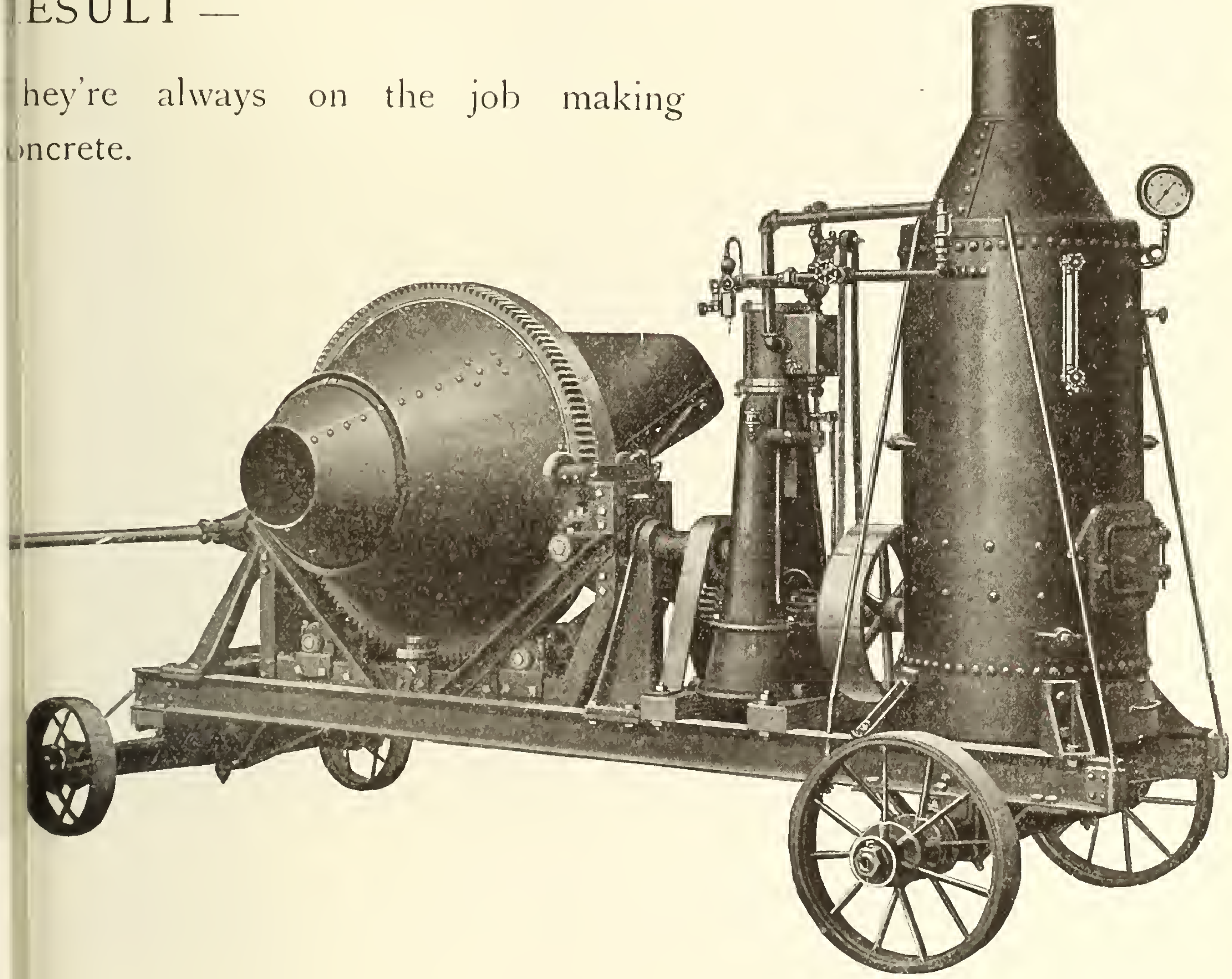
MUSSENS

e make them in Montreal, under our
vn supervision.

e use only the best materials.

ESULT —

hey're always on the job making
ncrete.



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LIMITED

Winnipeg, 259-261 Stanley St.
Calgary, 121 10th Ave. East.
Vancouver, 365 Water Street

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  - Inglis Co., John
  - McDougall Caledonian Iron Wk

(Continued on page 12)

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Residence of Mr. J. C. Eaton, Toronto. **Messrs. Wickson & Gregg, Architects**

Don Valley Porous Terra Cotta Fire Proofing, Foundation Bricks, Facing Bricks and Enameled Bricks Exclusively Were Used in This Structure

¶ These bricks have been the unanimous choice of discriminating architects and owners in competition with samples submitted by the leading brick firms of Canada and the United States. They are the only thoroughly vitrified facing bricks ever manufactured in the Dominion, and the most exclusive high-class pressed brick on the American continent.

¶ The above view is an illustration of one of the many important buildings in which this product is used.

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Most
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Least
Fixing

When you figure on a contract you always study the details. Of course,—but WHY?

Because in the details lies the danger of loss and it's just the same when buying Concrete Mixers.

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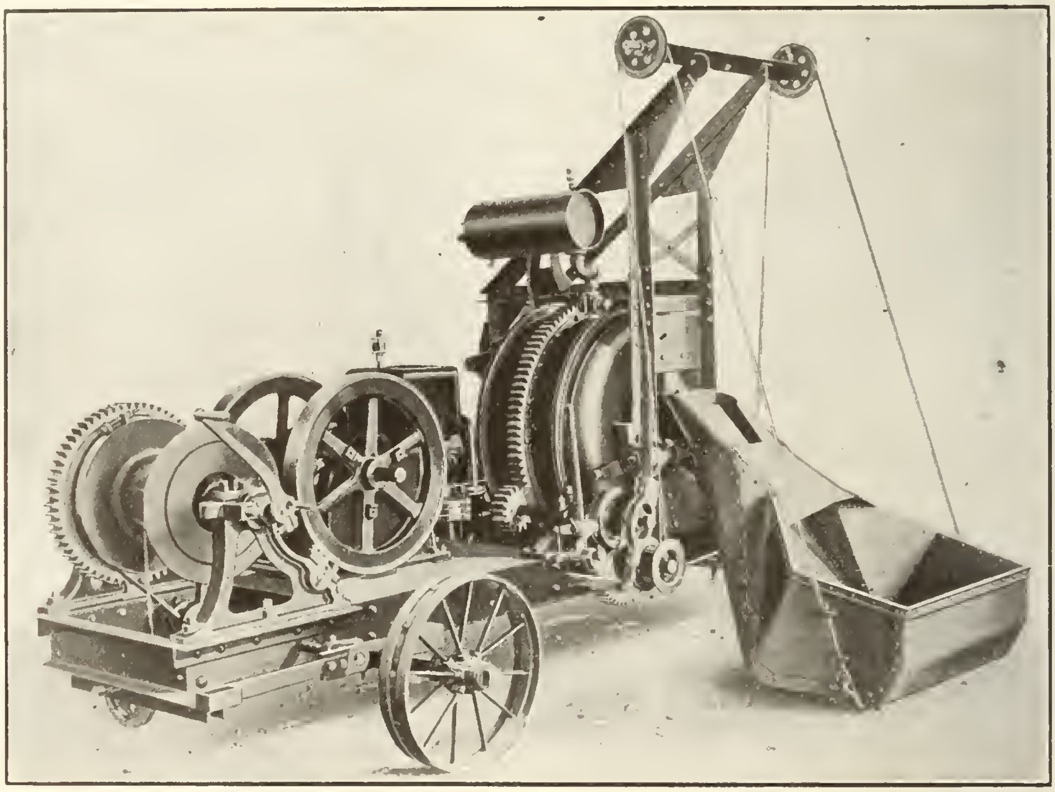

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Before you Buy Machinery or Equipment of any kind

write to us for our 1912 CATALOGUE. It will save you TIME and MONEY. Do you know that we are the ONLY LARGE MANUFACTURERS who specialize on

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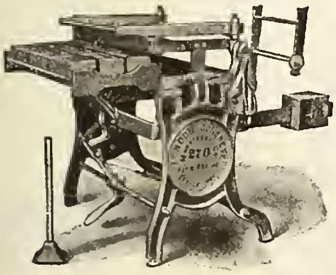
The following is a few of our lines

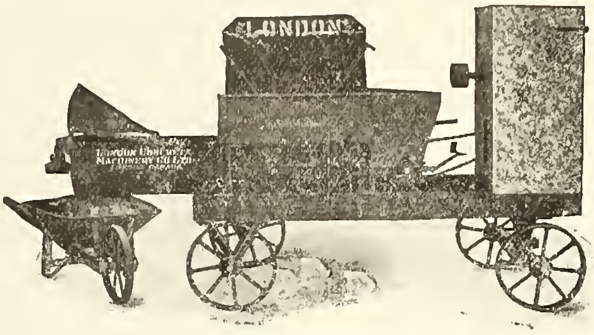


London Cement Brick Machine

London Standard Drum Batch Mixer in Five sizes any kind of Power or Equipment.

Drum Paving Mixer with Forward Loader and and Rear Discharge.

Drum Paving Mixer with Side Loader and Rear Discharge.



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Automatic Batch Mixer Two sizes any kind of Power.

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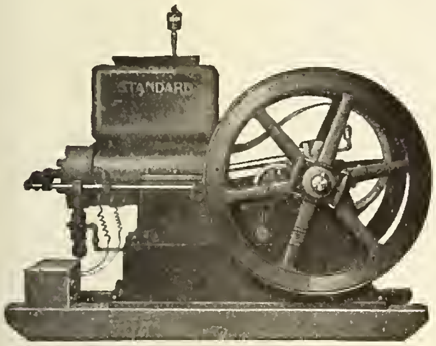
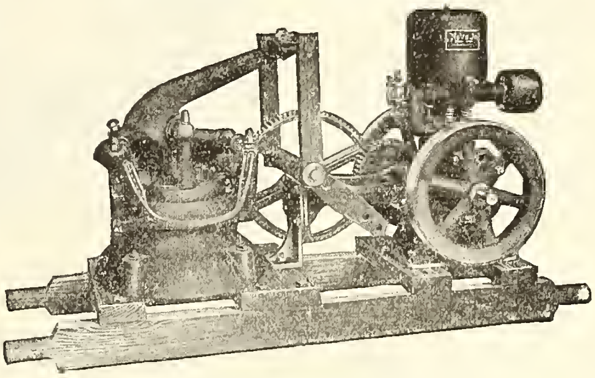


Standard Gasoline Engine



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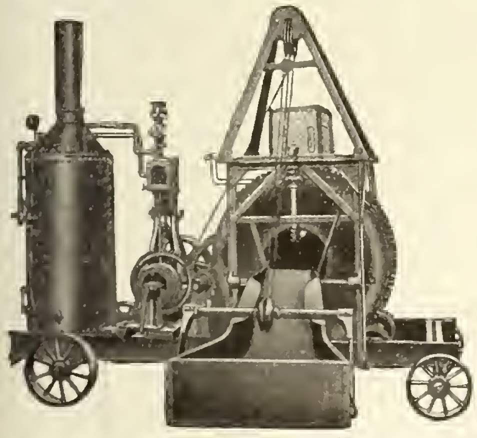

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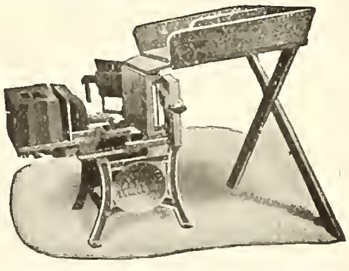

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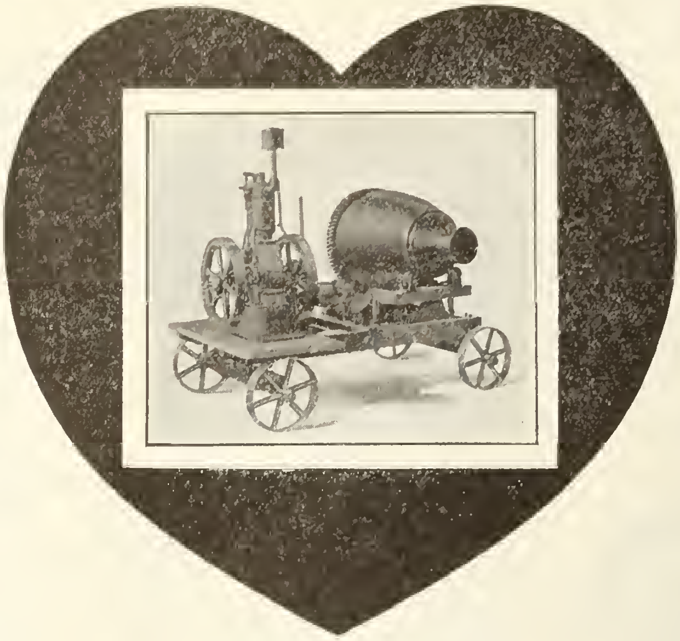

THE

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Every day new contracts are being given for Roadmaking. Tenders are being called for all kinds of concrete work. Arrangements for vast volumes of this business are now being completed. Are you getting your share of this work? Does your equipment enable you to take all you can get?

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It is the most reliable on the market.
The Heartshape Drum will give a quick and positive mix and a clean dump.
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See the little Mixer in the cut

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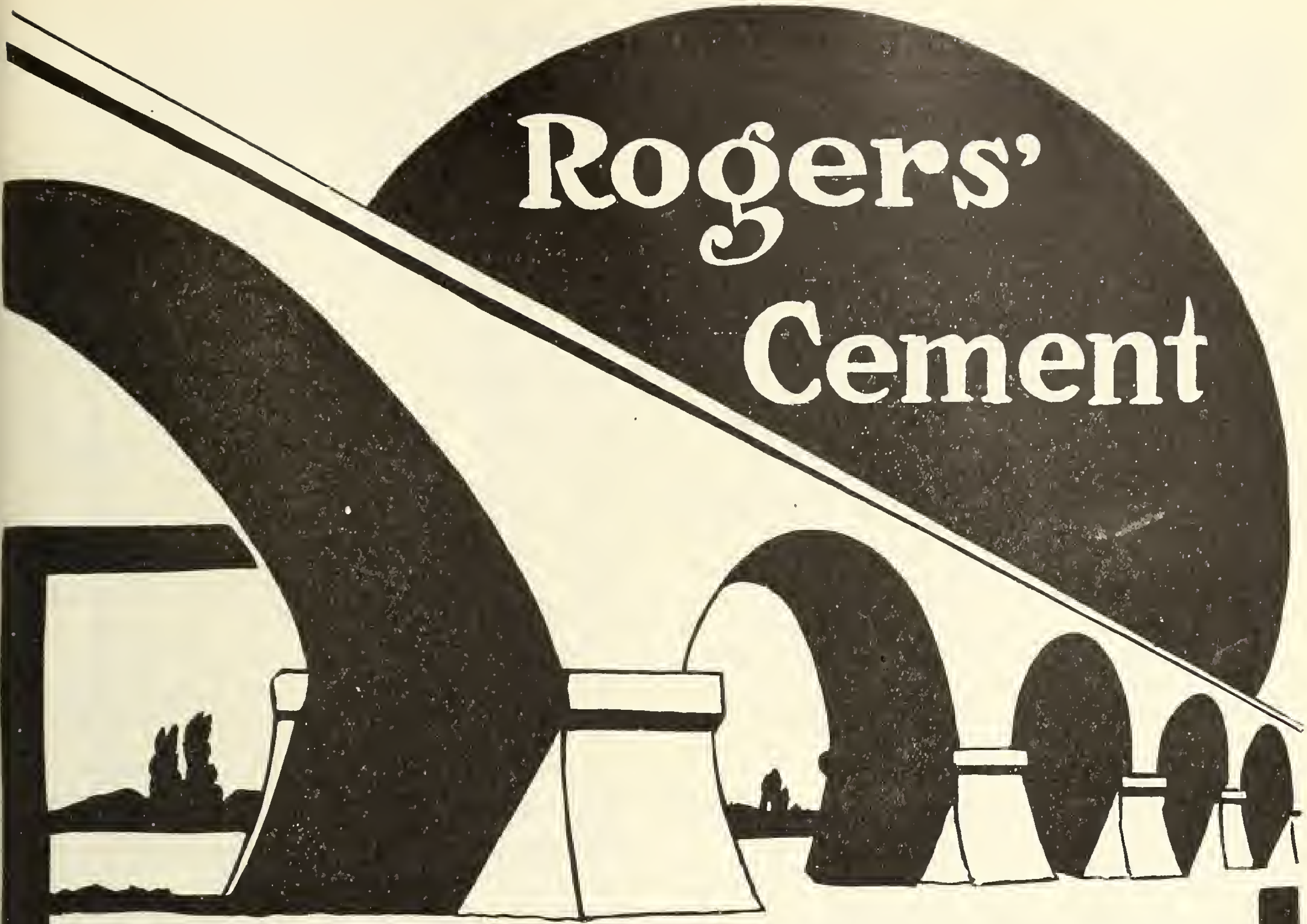
Continuous Demonstrations at

Wettlaufer Bros.

178 Spadina Ave. Toronto, Ont.



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Engineers and Architects who specify Rogers Brand Portland Cements have *every protection* afforded their work as to *stability* and *successful* construction, while the erecting contractor has available stock at *near-by* freight points, *reserve* stock for *prompt* shipments, and Portland Cements that offer every facility of *easy and rapid construction* with concretes of strengths that are *over usual standards* for their proportion of aggregates.

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4

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(Continued from page 6)
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  Ontario Wind Eng. & Pump Co.
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  Erie Machine Co.
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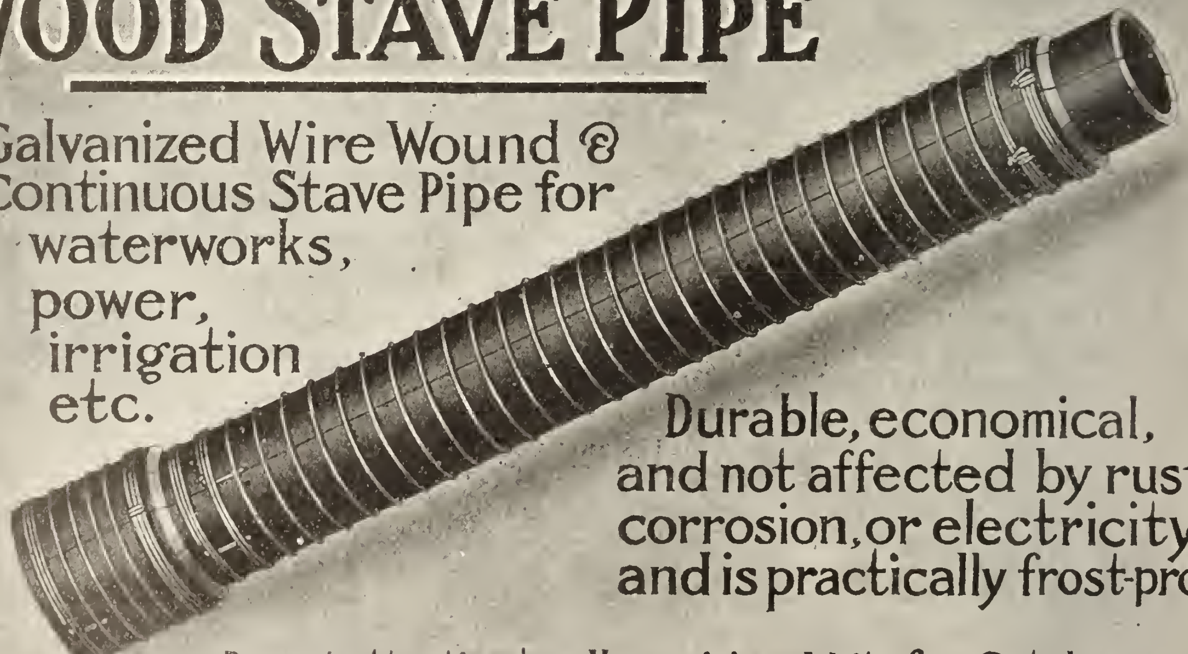

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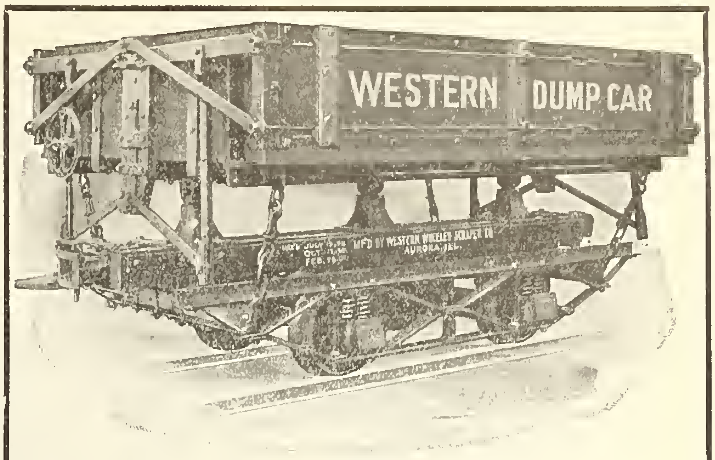

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The Western Four Yard Car

is ideal size for 3-ft. gauge. It is unbeatable in design and construction—ample capacity for heavy loads, yet of low, compact form, with bed and truck separable, steep dumping angle and automatic pivoted side boards. It is dependable in **any** service.

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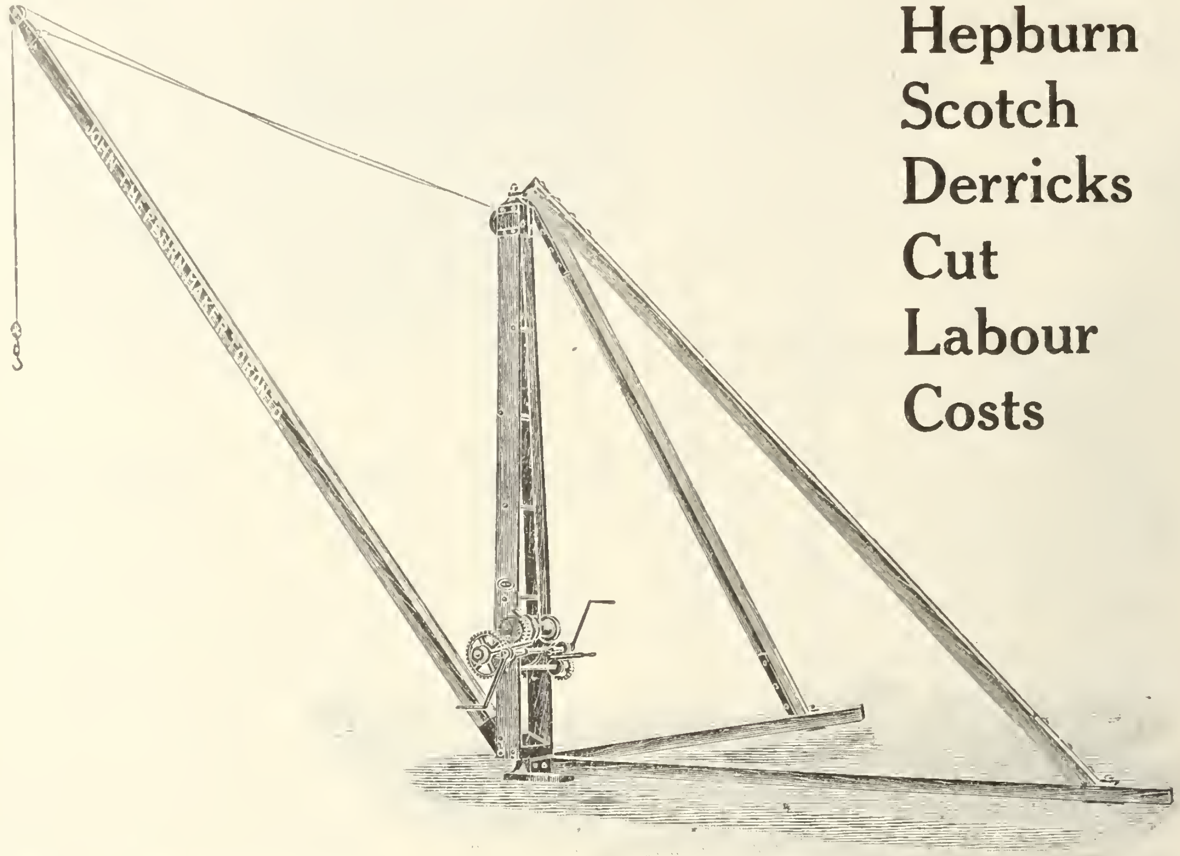
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¶ From first to last Hepburn Derricks are Hepburn-made. We **know** every part is **right** before it goes in.

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Ainsworth & Sons, Wm. ....
Albert Manufacturing Co. 81
Alsen's American Portland Cement Works. 78
Ambursen Hydraulic Construction Company of Canada, Limited ....
American Enameled Brick & Tile Co. 82
American Hoist & Derrick Co. 2
American Spiral Pipe Works 79
American Surety Company 82
American Water Softener Company ....
American Well Works ....
Anderson & Co., 1905 Ltd., George 22
Andresen, H. P. ....
Asbestos Mfg. Co. 99
Austin Drainage Excavator Co., Ltd. .. ..
Automatic Wood Box & Turning Co. 82

Bain & Ross 92
Bates & Edmonds Motor Co. 23
Batts Limited ....
Beatty & Sons Limited, M. 79
Beckman Company, L. ....
Bell Filtration Co. of Canada, Ltd. 104
Bennett, Robert 98
Berg Manufacturing Company ....
Blystone Manufacturing Company 99
Bowman & Connor 92
Bremner Limited, Alex. 91
Briscall, William ....
Britnell & Co., Ltd. 86
Brodie & Company, James ....
Brown Hoisting Machinery Co. 83
Browning Engineering Company 63
Buffalo Meter Company 27
Business Systems Limited 95
Bryan Manufacturing Company 104

Cabot, Samuel ... .
Canada Cement Company, Ltd. 3
Canada Foundry Co., Ltd. 20-77-97
Canada Iron Corporation Limited 91
Canada Steel Company 31
Canadian Store Front Company 85
Canada Wire & Cable Company 23
Canada Wire & Iron Goods Co. 79
Canadian Boving Company 30
Canadian Bridge Co., Ltd. 88
Canadian Fairbanks-Morse Co., Ltd. 22
Can. H. W. Johns Manville Co. 25
Canadian Kellogg Company ....
Canadian Office and School Furniture Company, Limited ....
Canadian Norcross Bros. Co. 18
Canadian Pipe Company, Limited 90
Canadian Rand Company, Limited 1
Canadian Supply Company 28
Cement Era Publishing Company 13
Ceresit Waterproofing Company 105
Chain Belt Company 109
Chalmers & Wilson 94
Chipman & Power 92
Christie Henderson & Company 79
Cleveland Bridge & Engineering Co., Ltd. 88
Cleveland & Erie Mach. Co. 87
Cloisonne Glass Limited ....
Colonial Glass Co. of Canada ....
Cook, A. D. ....
Commercial, The 87
Conduits Company, Limited 91
Consolidated Glass Company 25
Consumers' Gas Company ....
Consolidated Optical Co., Ltd. ....
Consolidated Stone Company ....
Contractors' Supply Co., Ltd. 86
Corinthian Stone Company 24
Cream City Equipment Company 94
Crushed Stone Limited 95

Dahlstrom Metallic Door Company 86
Dennis Wire & Iron Works Co., Ltd. 90
Des Moines Bridge & Iron Co. 79
Dickson Bridge Works Co., Ltd. ....
Doolittle & Wilcox, Limited 91
Dominion Bridge Co., Limited 88
Dominion Concrete Company 84
Dominion Creosoting Company 80
Dominion Marble Company, Ltd. 21
Dominion Sewer Pipe Co., Ltd. 21
Dominion Wood Pipe Co., Limited 12
Don Valley Brick Works 7
Down Draft Furnace Company 98

East Iron & Machine Company 78
Escher Wyss Company 105
Elaterite Paint Company ....
Eastern Pipe & Construction Co., Ltd. 103
Eaton & Company, T. 84
Erie Machine Shops 87

Factory Products Limited 35
Farmer, John T. 92
Ferguson, H. S. 92
Ford Iron Company, Limited 8
Foundation Company 93
Fuce, Edward O. 92

Galt Art Metal Company, Limited ....
Galt Engineering Co., John 92
Garlock Packing Company 36
Gartshore, John J. 92
Gartshore-Thompson Pipe & Foundry Company, Limited 90
General Machinery Co., Limited 98
Georgian Bay Shook Mills, Limited 111
Gibb, Alexander 98
Goodyear Tire & Rubber Co. of Canada, Ltd. 33
Greening Wire Co., Ltd., B. ....
Guarantee Company of North America 92
Gurley, W. & L. E. 85

Hagersville Contracting Co., Ltd. 13
Hamilton Pressed Brick Company 34
Hamilton Machinery Company, Limited 26
Hancock, Jr., H. Syd. 92
Harvey, J. 87
Heinicke Inc., H. R. 96
H. & E. Lifting Jack Company 103
Hepburn, John T. 14
Hobbs Manufacturing Co., Ltd. ....
Holmes & Sons, Fred 94
Hopkins & Company, F. H. 112
Hotchkiss Lock Metal Form Co. 26
Huber Manufacturing Company 103
Hunt & Company, Robert W. 92
Hunter Bridge & Boiler Co., Ltd. 89

Imperial Wire & Cable Co., Ltd. 111
Improved Equipment Company ....
Inglis Company, John 75
International Marine Signal Co., Ltd. 29

Jamieson Lime Company 100
Jenckes Machine Company, Limited 2
Johnston, A. H. 96
Johnston & Chapman Company 23

Kennedy, James C. 92
Kerr Engine Company, Limited ....
Koehring Machine Co. 32

Laurentian Granite Co., Ltd. 92
Laurie & Lamb 108
Lea, R. S. 92
Leach Concrete Company 100
Leonard & Sons, E. 95
London Concrete Machinery Co., Ltd. 9
London Gas Power Company, Ltd. 76
Luxfer Prism Company ....

Mace, T. Harry 92
MacKinnon Holmes & Co., Ltd. 108
MacLean Daily Reports 102
Marsh & Henthorn Limited 76
McCoy Company, Henry J. 25
McDougall Caledonian Iron Wks. Co., John 77
Mahan & Company 98
McMillan & Son, W. 100
McNally & Company, William 89
Meadows, George B. 35
Metallic Roofing Company, Limited 76
Metropolitan Paving Bricks Co. 31
Miller & Company, George M. ....
Mitchell Company, Ltd., Robert 88
Missisquoi Marble Co., Ltd. 82
Montreal Locomotive Works, Ltd. 95
Morrison & Co., T. A. 92
Munderloh & Co., Ltd. 13
Mussens Limited 4
Myers, Oakley 95
Municipal Engineering & Contracting Co... 32

National Bridge Co., of Canada, Ltd. 89
National Iron Works Limited 91
Neptune Meter Company 27
Noble, Clarence W. 78
Northwestern Terra Cotta Company 83

Ontario Asphalt Block Co., Limited 78
Ontario Lime Association Limited 81
Ontario Sewer Pipe Co., Ltd. 29
Ontario Wind Engine & Pump Co., Ltd. .. 95
Ormsby, Limited, A. E. 17
Oshawa Interior Fittings Co. ....
Owen Bucket Company 103

Pacific Coast Pipe Company, Limited 1
Page Wire Fence Company, Ltd. 83
Pedlar People Limited 110
Phoenix Bridge & Iron Works, Limited .. 89
Piggott & Company, Thos. ....
Port Credit Brick Co., Ltd. 90
Power & Son ....
"Prime White" Road Oil Company ....
Pyle-National Electric Headlight Co. 19

Queenstown Quarry Co., Ltd. 91

Reid & Brown 92
Rhodes Curry Company, Limited 76
"R. I. W." Damp Resisting Paint Co. 19
Rogers Limited, Alfred 11
Roman Stone Co., Limited 15

Sackville Freestone Company, Ltd. 29
Sand & Supplies, Limited 89
Sarnia Bridge Company, Limited 89
Sheppard & Sons, James 101
Slack, T. 92
Smart-Turner Machine Co., Ltd. 1
Smith, Limited, Thomas & William 106
Smyth & Ryan 96
Standard Drain Pipe Co., Ltd. 21
Standard Foundry & Machine Company 35
Standard Ideal Company, Limited 36
Standard Scale & Supply Company 109
Steel Company of Canada 30
Steward, A. P. 74
Stinson-Reeb Builders' Supply Co. ....
Sturtevant, B. F. 96

Taylor, J. & J. ....
Tide Water Iron Works 81
Thew Automatic Shovel Co., The. 31
Thompson & Co., B. & S. H. 21
Tiffin Wagon Company 107
Toledo Wheelbarrow Company ....
Toronto Furnace & Crematory Co. 101
Toronto Plate Glass Importing Co., Ltd. 1-83
Trussed Concrete Steel Company 82
Turner, C. A. P. ....
Turner & Sons, J. J. 99

Union Water Meter Co. 27
Universal Crusher Company 26
Urschel Bates & Company 96

Vulcan Iron Works 94

Wadsworth Howland & Co., Inc. 79
Waterous Engine Works Co., Ltd. 82
Watson Wagon Company 107
Watts & Son, E. R. ....
Weeks, Arthur L. 92
Wells & Gray, Limited 102
Western Canada Contractor 86
Western Wheeled Scraper Company 13
Wettlaufer Bros. 10
Whitehead & Co., Ltd., John ....
Wilson Bros., Ltd. ....
Woods Limited 27

York Sand & Gravel Co. 86

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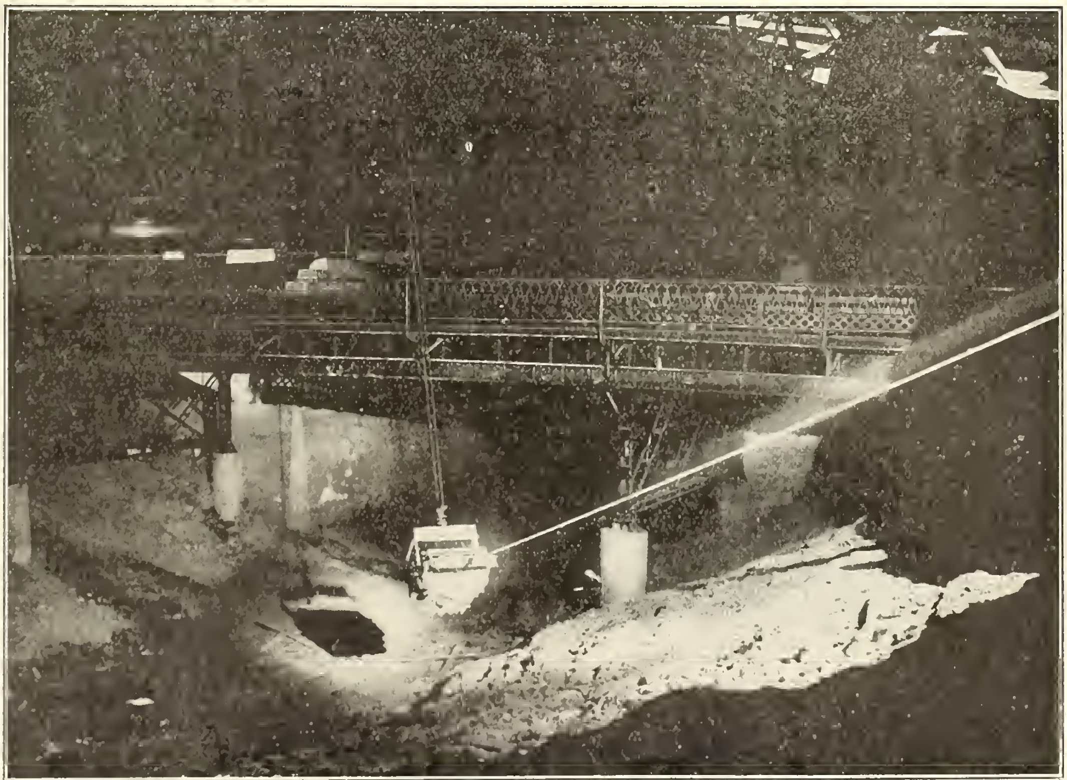

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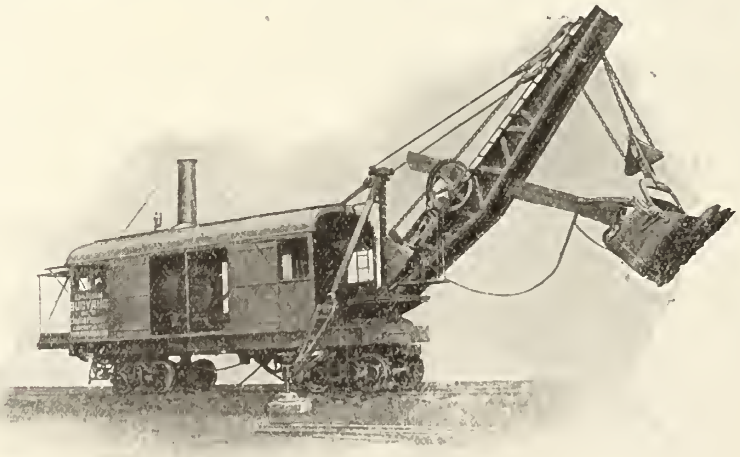

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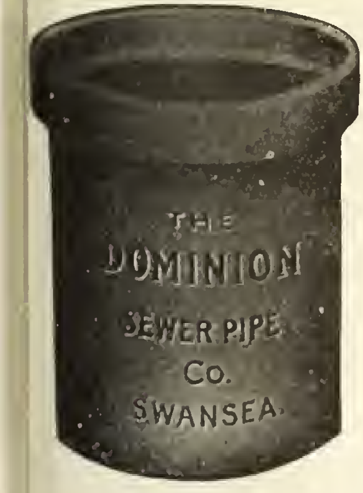

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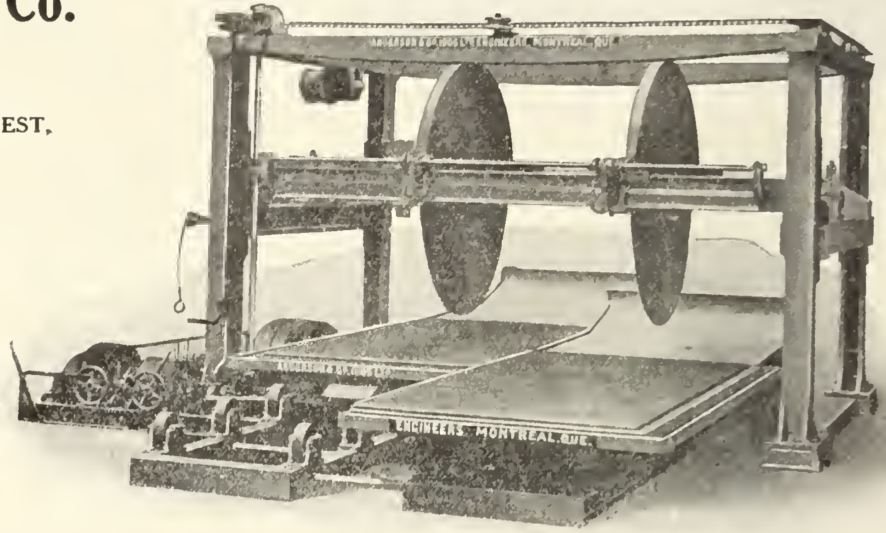

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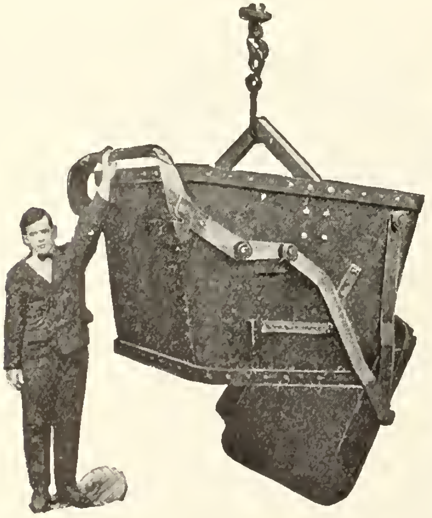

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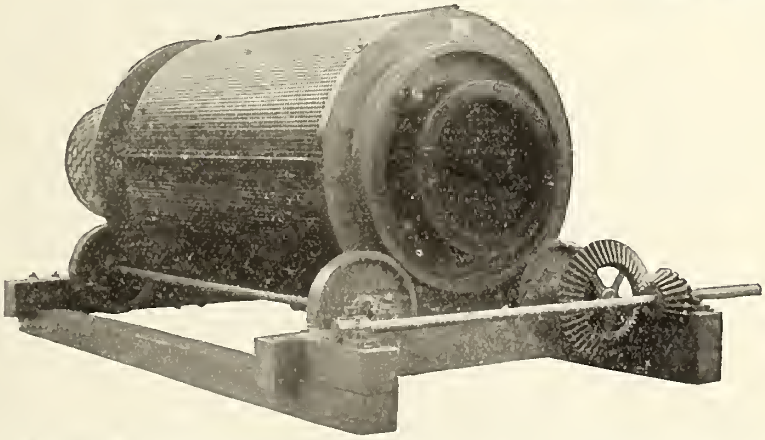

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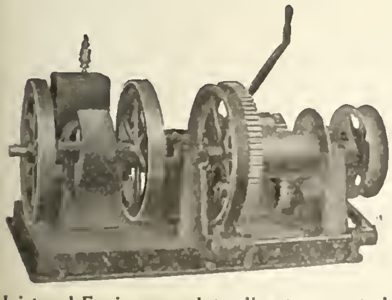

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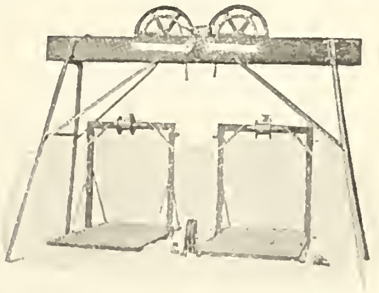

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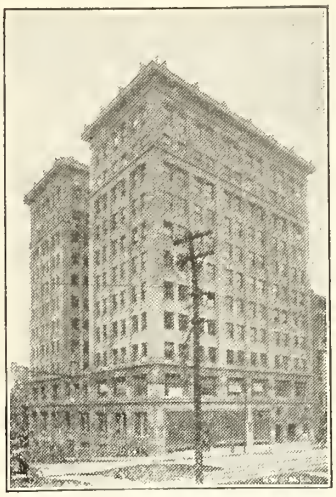

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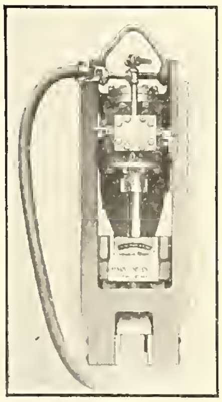

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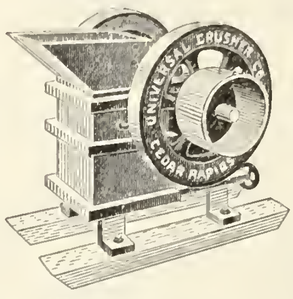

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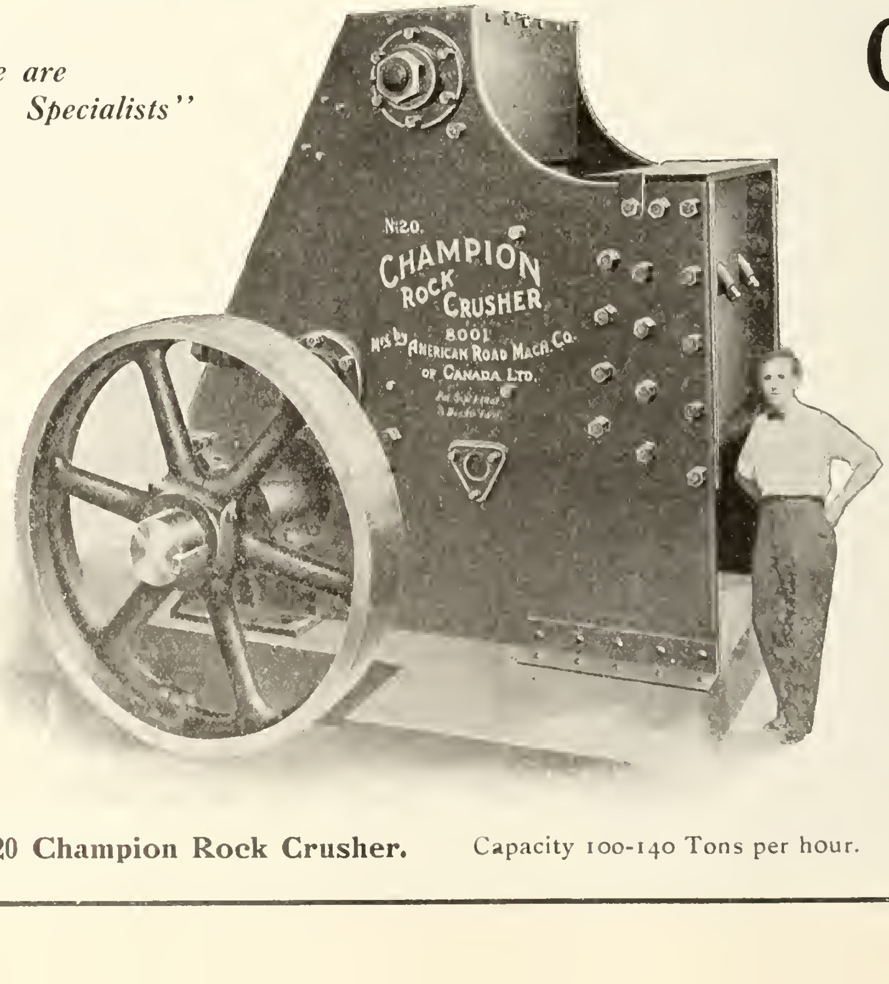

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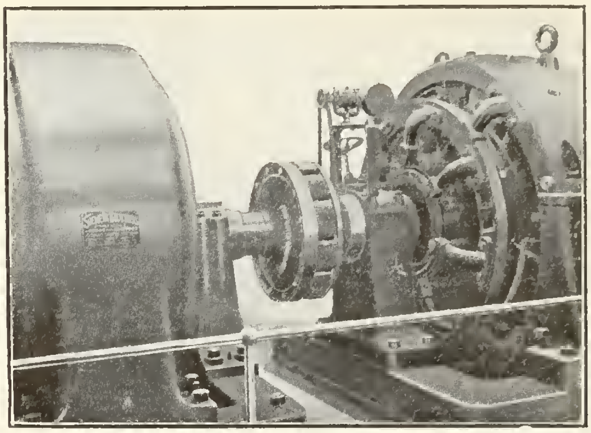

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The contractor whose equipment includes one of these light shovels, capable of doing the work of thirty or more laborers and economical if it replaces only four or five men, can underbid the contractor who is not so equipped. He can move a given yardage in a shorter time, at a lower cost, and with less trouble. He is recognized as up-to-date in his methods, is given an opportunity to figure upon the best jobs, and will usually receive the preference, other conditions being equal.

The THEW SHOVEL will handle cuts as shallow as 12 inches and give economical results. It will rip up old macadam and handle rough, stony ground most effectively.

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THE THEW AUTOMATIC SHOVEL CO., Lorain, Ohio

Canada Steel Co., Limited, Hamilton, Ont.

(Independent of all mergers)

Manufacturers of **STEEL** **For Reinforcing Concrete.**
Plain Rounds, Squares or Twisted Squares.
Cross Arm Braces, plain and galvanized.

ANGLES from ¾ x ¾ in. up to 2 x 2 ins.
ROUNDS and SQUARE from ¼ in. up to 1¼ ins.

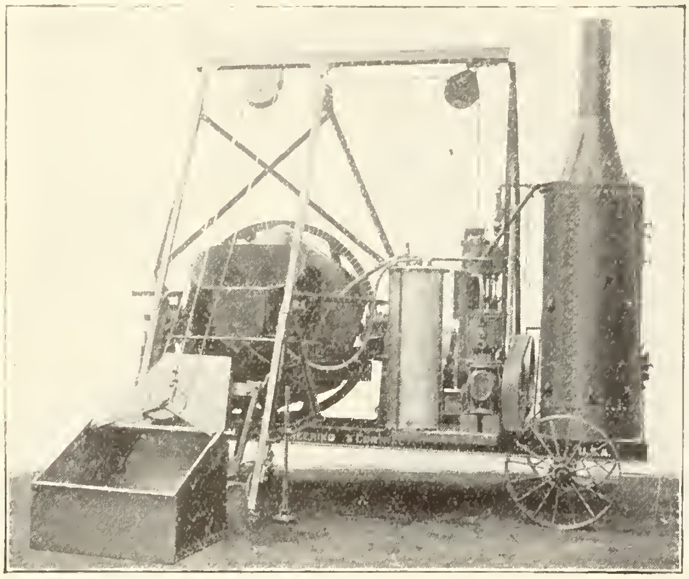
We can ship from stock

FLATS from ¾ in. up to 4 ins. in width, and other special sections.

Ask us for prices—they will interest you.

Office and Works : Sherman Ave., North

Lengthen the Life of Your Ashphalt Pavements



The customary method of laying asphalt pavement is crude and expensive. Not one-half the efficiency is obtained, because the asphalt is not properly laid. When cracks and holes appear the asphalt is blamed but when contractors cease pouring the liquid asphalt over the crushed stone, when they adopt the new Austin System of first drying the stone and then mixing it with the asphalt in a

Chicago Improved Cube Mixer with Austin Heating Attachment

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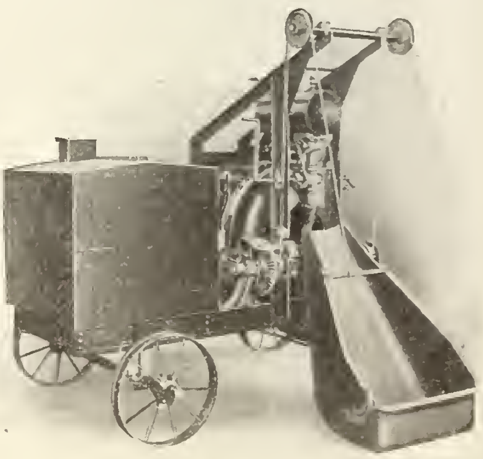
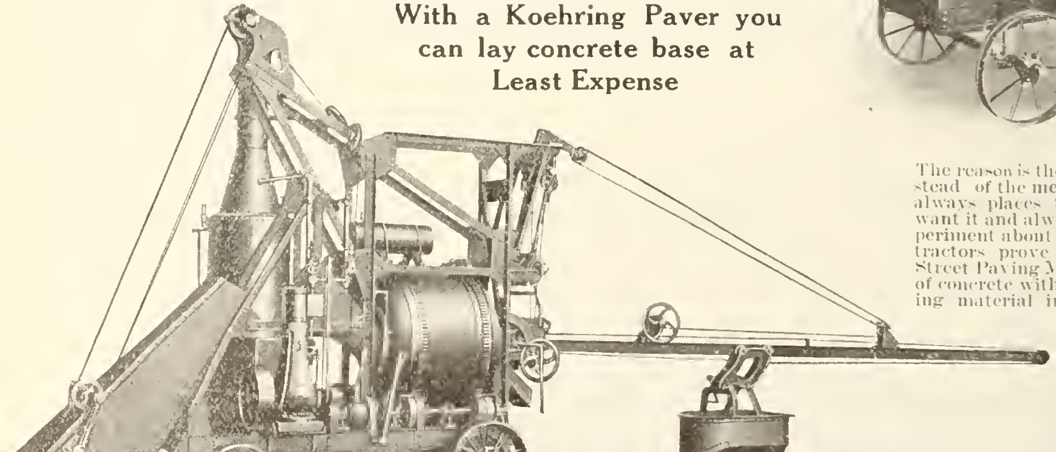
The Koehring 3 in 1 principle of mixing means three times as much mixing or an equal amount of mixing in one-third of the time. There are three independent and opposed mixing actions in the Koehring drum producing thoroughness of mixing and rapidity of mixing and a uniformity of mixing, no other Mixer equals. There are also equally important advantages in the mechanical construction of the Koehring Mixer.

The heavy cast special metal Koehring drum will outlast the drum of any other Mixer. The railroad truck bearing truss and the rollers being keyed on to the axle, makes "wabbly" drums impossible.

The charging bucket raises to a nearly vertical position so that all the material will pass into the drum without pounding the bucket. There are numerous other important features in the Koehring Mixer that you should know about.



With a Koehring Paver you can lay concrete base at Least Expense



The reason is the machine conveys the concrete instead of the men, and it's a dependable conveyor, always places the concrete exactly where you want it and always dumps clean. There is no experiment about it, the records of dozens of contractors prove the economy of the Koehring Street Paving Mixer and it combines this placing of concrete with a simple charging bucket for getting material into the drum in shortest possible time and least number of men, also, it has traction drive for moving the machine along the line of work and keeping close to the material pile. This builds contractors reputations and pays handsome profits. Aren't you interested in this reputation and profit making?

KOEHRING MACHINE CO., Milwaukee, Wis. Exclusive Sales Agent for Canada: **Canada Foundry Co., Limited**

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Goodyear Rubber Belting is manufactured by a process that makes it proof against steam, water, weather and rot. Made in all three grades and all sizes. For Pulp, Paper, Saw Mills—*all* mills where horse power transmitted is large and demand for tensile strength great. Used by biggest lumber mills and manufacturing plants in the Dominion. *Outlives, outlasts,* all other belts.

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Built for all purposes. For conveying crushed stone, grain, coal, ore, etc.

Made in all thicknesses of face to suit requirements of buyer. Rubber face made of toughest stock possible, to prevent cutting and chipping. Gives longest, most enduring service.

We also manufacture other rubber goods such as tires, all kinds of hose and belting, rubber packing, etc.

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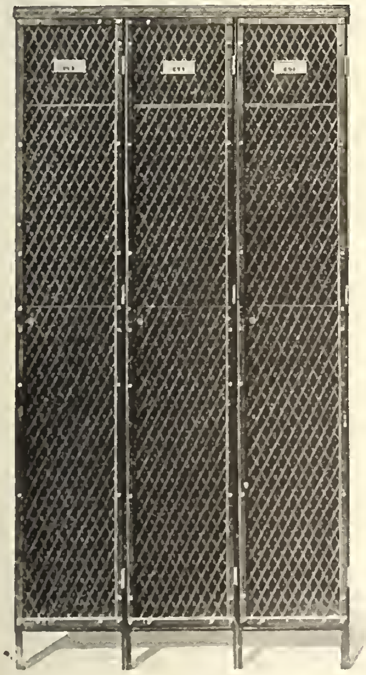

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We make a specially reinforced manhole cover that fits snugly and is unusually strong.

Our other products include Building post caps, plates and hangers, scruppers and brass castings.

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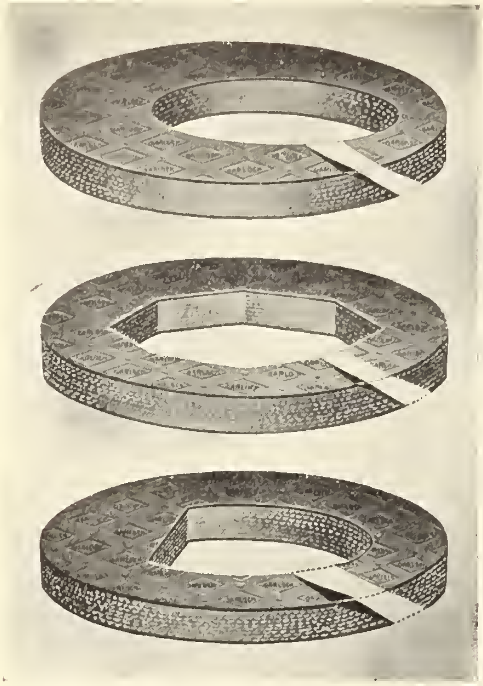

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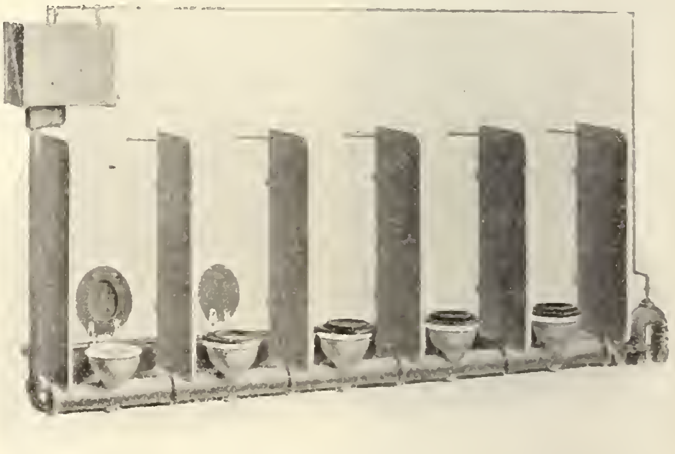

Plate F. 517

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ESTABLISHED 1886

Contract Record and Engineering Review

PUBLISHED EACH WEDNESDAY BY

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Alphabetical Index of Advertisers Page 16

Vol. 26 March 20, 1912 No. 12

Prophets Without Honor

THE ratepayers of Burnaby, B. C., are rising up in protest against the action of their council in appointing a citizen of the United States to the position of Construction Engineer, at a salary of $250 a month. We are not very well acquainted with this suburb of Vancouver, but the information predisposes us in favor of the men of Burnaby.

Local authorities in Canada are all too prone to overlook the claims of their own countrymen. Many of our councillors ignorantly believe that the United States engineer is better trained than his Canadian confrere. Others have an exaggerated idea of the value of getting "new blood" into an organization, while not a few are so hopelessly incompetent in their own sphere that they imagine all other local men to be in the same class.

Canadian municipalities have a well-defined duty by Canadian engineers. The Canadian boy is brought up in Canada and imbibes Canadian teaching. His ideals are Canadian; he thinks imperially; his nationality is British. British principles have been inculcated in him from his youth up. For the rest, not only are all the lessons that he has ever learned, Canadian, but his aspirations also are centred in Canada. He looks forward to making fame and name in Canada, to earning Canadian money, and to spending it in promoting Canadian enterprises. His education is paid for in Canadian dollars, oftimes earned and saved singly for the specific purpose.

We will admit that among our practising engineers there are many who do not belong to the above type, but we have to deal with the majority, and it is they who should receive the first consideration at the hands of the city councils of such places as Burnaby and Moose Jaw.

There is much worthy of emulation in the people of the United States—notably their aggressiveness and their supreme confidence in their own ability. We should do well to cultivate a greater measure of that confidence—always provided that it were manifested in that unassuming, dignified manner that always goes hand in hand with real ability. But—once more—Canada is essentially an engineering country, and Canadians, by virtue of their knowledge of conditions and of their innate qualities of adaptability and resourcefulness, are pre-eminently qualified to build up that country. By all means let us emulate whatever may be good in our neighbors to the south. By all means let us stimulate and encourage trade between the two countries. But in so doing let us not forget our own nationality. The appointment of eminent United States experts to consult with our own engineers in cases of exceptional difficulty and magnitude is advisable, but the argument cannot be employed to defend the selection of either a U. S. Construction Engineer for Burnaby at a salary of $3,000 a year, or a U. S. Engineering Commissioner for Moose Jaw at $6,000 a year.

Canada Solid for Good Roads

IN the Saskatchewan Legislature at Regina last week Acting-Premier Calder made the important announcement that the Provincial Government would expend $5,000,000 for good roads. No details were forthcoming in explanation, the announcement being simply that the measure would be brought down in a day or so.

This latest announcement will bring the value of the road building which Canada is undertaking up to something like $35,000,000. This is a conservative estimate made up of the announced plans for an expenditure of $5,000,000 each by the provinces of Ontario, Manitoba, Saskatchewan and British Columbia, $5,000,000 by the Dominion Government, and $10,000,000 by the Province of Quebec. Such a programme cannot fail to stimulate tremendous activity in all parts of the country. All identified with construction in any way will be benefited, for good roads work is the forerunner of every kind of development.

The Provincial and Federal Governments are to be congratulated upon the manner in which they have risen to the occasion in prosecuting this great national enterprise. With the continuation and augmentation of such a policy, within the next few years Canada will enjoy a meed of prosperity that will surpass the predictions of the palmiest soothsayers.

"Smartness" in Advertising

AN interesting decision was given recently at Toronto in respect to an action brought by an advertising agency to recover damages and commission from a firm which had broken a contract for a year's advertising owing to what it claimed to be unsatisfactory service on the part of the agency in publishing its advertisements with display headings among reading matter, instead of purely and simply as reading matter. In giving judgment for the agency for the full amount claimed, with $250 damages for breach of contract, Chief Justice Falconbridge commented as follows: "If it is at all material, there is no evidence to show me which form of advertisement is the more likely to attract purchasers or customers. Personally, I would rather buy from the man who frankly displayed his advertisement than from one who under false pretences induced the unwary to peruse half a column of more or less interesting matter only to come suddenly upon an announcement of the merits of a certain line of goods. Against this person one cannot help feeling a certain amount of resentment."

The observations of the Chief Justice are most opportune and are applicable to all forms of advertising. Certainly it is a poor way to attempt to make an abiding impression for good by commencing with a petty deceit on the reader. The "smartness" which will entrap a man into the misapplication of his time, the misdirection of his effort, has or should have no place in the business methods of any well-balanced, self-respecting community. Such a policy is defended by some on the ground that the main object of advertising is to attract attention and that if that object is achieved the particular form of advertising is efficacious. To this we reply that the main object of advertising is not to attract attention but to attract favorable attention, to create a good impression, to stimulate healthy interest.

During the past week or so the name ot Capt. Amundsen, the intrepid explorer of the Antarctic regions, has appeared in the headlines of practically every newspaper in the world. If a man were a malefactor on a sufficiently large scale he would attain the same end. The difference is in the kind of publicity. The gulf is between fame and notoriety, and so it is with advertising. That reprehensible form of advertising that is "smart" and misleading gains for itself and for those who promote it a cheap notoriety which is as hard to throw off as the worst reputation.

Advertising, to attain its highest end, should represent the man—should represent him in his most straightforward argument—and just as one esteems candor and honesty in the man so does one appreciate the same qualities even when they are conveyed through the medium of an advertisement. In like manner one is attracted—or repelled. Advertising plays a great part in the business life of to-day and nothing is more certain than that that part will be continued and augmented. No effort then should be spared to raise advertising to its highest plane.

Little has been accomplished in the long-looked-for revision of the Toronto building by-law. Announcement is now made that the City Architect has made a number of important changes in certain portions of the code, these being chiefly in regard to reinforced concrete construction. We are told that Mr. McCallum desires to obtain "fuller information concerning the engineering and architectural practice touching this class of work in the principal cities of the United States before making his final recommendations." Some assurance has been given, however, that the regulations governing concrete structures will be considerably modified.

Screw piles were used recently in the construction of a bridge on the South African Government Railway across the Gamtoos River, near Port Elizabeth. The foundation conditions were unfavorable as the result of deep silting in the river by heavy floods. In 1904, during the early work of construction of the road, and while there was a temporary timber bridge over the river, the water rose several feet above the tracks and in 1905 another flood produced a depth of 45 feet where there was normally 15 feet of water. When borings were made for a permanent structure the depth of the silt from floods of this character was such that no hard material was struck until conglomerate and shale were reached at 90 feet. Before deciding on the type of foundation, a test pile was put down 50 feet and weighted with rails to double the load to be carried. Timber piles were considered satisfactory for the approach piers, but the channel piers carried about 1,000 tons each, and more secure foundations were sought. Cast-iron screw piles were consequently driven to sand beds underlying the silt. They were 15 inches in diameter and made in 10-foot lengths, bolted together. The bottom of the pile was in each case closed to prevent entrance of sand, and fitted with a screw blade. After sinking, they were filled with concrete. The piles were screwed down by means of a steam winch and endless wire rope passed around a 20-foot capstan wheel, fitted to a shaft, which was bolted to the section to be screwed down. In each of the channel piers 24 screw piles were sunk, the depths being 50 to 70 feet. Tests showed them capable of carrying 80 tons, or double the load required.

Revised Specifications

A joint meeting of architects and builders was held recently at Boston. The suggestions made are equally applicable to Canadian conditions. In the matter of scale drawings it was considered that with a ⅛-inch scale drawing there should be furnished ¾-inch scale details for every part of the plans that needed explanations. That the specifications should not be long, as a multiplicity of words leads to confusion. That the so-called "Blanket Clauses" which specify that the work "be done as the architect shall direct" should be eliminated, as it is introduced either from habit or because the architect does not know just what he wants. That architects ought to ascertain from builders whether things which they might contemplate are feasible or not. That the general contract is best for owner, architect, and all concerned, and that the architect should select responsible, experienced subcontractors and require the general contractors to employ them. That there should be a standardization of clauses in specifications in order that the personal equation might be eliminated as far as possible.

Experiments have recently been carried out in Germany with the object of discovering methods and means for rendering walls and ceilings capable of effective resistance to sound transmission. One of the more recently devised methods involves the use under the ceiling, or parallel to the wall, as the case may be, of a network of wire stretched tightly by means of pulleys secured into adjacent walls and not touching at any point the surface to be protected against sound. Upon the wire network is plastered a composition formed of strong glue, plaster of paris and granulated cork, so as to make a flat slab, between which and the wall or ceiling is a cushion of confined air, The method described is said to be good in two respects; first, the absence of contact between the protective and protected surfaces, and, secondly, the colloid nature of the composition recommended for the plaster.

Classified Municipal Expense Accounts

Requirements Outlined — Fundamental Principles and Methods of Classification—Some Accounting Fallacies—Value of Monthly Reports

THE purpose of expense accounts is to produce information regarding current expenditures which is to be regularly reported to the responsible officers of government.

Scientific accounting of itself will not make administration efficient. There still may be waste, mismanagement and theft even with the facts accurately and scientifically recorded; but scientific accounting will help any officer who has the will and the ability to conduct his department with economy and efficiency.

The value of a correct system of expense accounting lies in making facts readily available by means of reports and in enabling officials to make comparisons which will lead to a study of the reasons for high costs if they are high—in short, to ascertain where savings may be effected, which employees have been efficient, which functions should be expanded, and which may be restricted. In other words, every administrative policy and every future act should be preceded by exact information of what has happened in the past.

Particularly is a classified record of expenses invaluable in the preparation of estimates to be used as a basis for future appropriations.

Itemized Classification

One of the fundamental principles underlying the scientific classification of expenses is that the greater the number of logical, significant divisions into which expenditures can be divided, the easier it is to understand where money spent has gone and to detect excessive expenditures meaning extravagance, waste or misappropriation.

A second fundamental principle is that expenses should be so classified that the cost of each function or division of organization and the several elements of cost comprised therein may be clearly shown.

How accounts should be classified must be determined by the facts to be reported. The form of the report should be determined by the needs of the officer for information. The needs of the officer for information in turn are fixed by his responsibility. The data needed by the officer for the intelligent discharge of his duties must be of two general classes:

1. Data showing cost of operation as measured by product or service.
2. Data showing cost in terms of things or services purchased or contracted for.

The accounts necessary to obtain the first class of information are what are ordinarily regarded as either classified accounts or job cost accounts.

The analysis of data necessary to the consideration of economy and efficiency of contracting and purchasing must be along lines of objects of expenditure or of services and things purchased and paid for—classifications which will enable the officer to think in terms of what the city buys, what it pays for it, and whether it is adapted to the use for which the purchase is made.

It is frequently the case that, in order to state functional costs in correct detail, it is necessary to gather together the various elements of the costs of repair or other jobs in order to arrive at a job or unit cost. In this event wages or salaries accrued are charged to a general account within the functional group. From this account they are apportioned to the various jobs according to time reports showing the exact time chargeable to each.

The other elements of job cost, such as materials, superintendence and incidental expenses, are also apportioned. Materials are chargeable to a material account within the functional group either from stores requisitions or purchase invoices, and thence apportioned to the various jobs according to work reports accompanying time reports.

Although we may determine with reasonable certainty the divisions which should be made in stating expenses, we shall not have an exact record of what has happened unless we are careful to enter expense charges as of the date they are applicable. Judging from published reports, few cities seem to appreciate the importance of this practice. They enter charges as of the dates cash is paid out, notwithstanding they were applicable to the month or perhaps the year previous to such dates.

This practice is sometimes defended on the ground that the amounts overlapping at the end of the year will balance similar amounts at the beginning of the year. Obviously this is unscientific; but, granting that in many instances the yearly totals will not vary materially, there are many instances in which conditions affecting payments at the end of the year differ widely from those at the beginning of the year. The only way to be right is to employ right methods.

Monthly Reports

Moreover, yearly reports are no longer found to be sufficient. Efficient administration requires reports at least as frequently as once a month. Therefore, unless charges are entered according to the month in which they apply, there is never any certainty that there is a correct basis for administrative judgment or for comparison with other periods.

Another practice which is calculated to interfere with the ascertainment of correct statements of expense is that of buying supplies in quantities for more than a month and charging them direct to specific expense accounts. It is more economical, of course, to buy supplies and materials in large quantities, and this should be done whenever possible. In this event, however, they should be charged to a stores account. As supplies are required for consumption they should be obtained from stores on requisition, such requisition to cover not more than a month's needs. These requsitions may then be embodied in a report made at the end of the month by the person in charge of the stores. Charges to expense accounts may be made either from this report or from the individual requisitions.

It is highly important that there be means for determining currently the correctness of expense accounts; otherwise errors which may seriously affect administrative and financial judgment are certain to creep in. This may be done by (1) charging all items of expense to a single controlling account in the general ledger through the medium of a column in an invoice or voucher register in which transactions are entered chronologically, (2) posting the monthly total of the column to the ledger, then (3) posting the items to a subsidary record containing the detailed accounts.

This subsidiary record may be designed on the columnar principle, by which a number of accounts may be kept on one page by means of columns, or on the unit or block principle by which a separate page is assigned to each detailed expense account. Upon the first method the division or function is entered at the top of the page; the date, number, brief description and total amount of the item or charge are entered at the left, and the amount or amounts extended on the same line into columns headed with the detailed accounts.

By the second method the date, number, brief description and amount of the item are entered on a separate page which contains the detailed account, the divisions or functions being indicated by marginal thumb tabs. At the end of the month a schedule of the balances or trial balance of the subsidiary record must agree with the balance of the controlling account previously mentioned.

Detail Accounts Save Time and Labor

It must not be inferred that the keeping of many expense accounts as is here advocated necessarily involves additional labor, once the headings of the accounts are written. It entails practically no more work to post a charge to a detailed account than to a general account. On the other hand, the labor saved at the end of a period by not having to analyze or re-classify expenses is often considerable.

The story of what government costs is not fully told when a report of expenses by functions is made. The officer and the public can think more clearly in terms of the cost of specific units of service. What it costs to keep the pavements in repair is best answered by the cost of repairs per square yard. Waste can be more quickly located when unit costs are known. To ascertain unit costs it is necessary to keep physical records, that is, records of the physical things done or service rendered. The answer, then, as to whether administration has been efficient or inefficient is found in contrasting cost with service results and judging the accomplishment by the best standards obtainable.

How can a city tell whether its expenditure for a given public service performed is more or less than it should be? One of the best ways is to compare its expenditure with that of other cities. But, obviously, a comparison cannot be made without taking into consideration the results, expressed in terms of quantity, derived from the expenditure. This necessitates reducing costs to a comparable basis, which is done by dividing the total cost by the number of work units and finding the cost per unit or unit cost. For example, the total amount spent for direct labor, material and superintendence in laying 100,000 square yards of stone block pavement is found by a carefully kept record to be $189,675. By dividing this amount by 100,000 we find that the cost per square yard is $1.89. If we found that it was costing $1.69 in another city, or that it cost us only $1.79 in a previous period, we would immediately begin to look for the reason for the increase. It may be that in the other city the lower cost is accounted for by cheaper labor or cheaper material, or both. Possibly in a previous period material was cheaper. At all events the spirit of competition and emulation enters and there is a constant incentive to do things economically.

The Application of Electric Drive to Contractors' Machinery

Contributed by G. C. Parker, B.A.Sc., Toronto

In spite of the rapid adoption of electricity as an industrial power within recent years in almost all phases of work where a cheap reliable power is necessary, there has been a decided attitude of holding back on the part of not only the contractors themselves but the manufacturers in the application of electric energy for operating contractors' machinery.

There are several primary reasons for this. In the first place the manufacturers of machinery would of necessity have to alter their designs to a slight extent to suit the new power. This would have entailed no little expense in itself and there was a certain amount of doubt as to whether the innovation would be approved by the buyers of the machinery. Under these circumstances it is not to be wondered at that electrically driven hoists, cement mixers, and drills were developed by the manufacturers of electrical machinery who saw a large field for the successful operation of their product in hitherto untried branches of engineering.

The power companies would not meet the contractor half way and offer him a fair minimum rate for power. The intermittent nature of the demand and the necessarily short term of contract seemed to give them a reason for not wishing to cater to this class of service. Gradually, however, they have come to realize that such a load would increase their revenue and, on account of the hours of the largest consumption coinciding with the power company's "off peak" load, that the result will mean a small, although very desirable increase in load factor.

The contractors themselves were loth to give up a familiar form of power for one unknown in this class of worw when the successful operation of their equipment was essential to the successful of the contract. Not a few set-backs were given to the cause of the electric motor owing to the fact that the men having to do with the buying and installation of the motors were not familiar with that form of drive. When failure did occur, perhaps through no fault of the motor other than its adoption to a class of work for which it was not suited, such a failure was attributed to the new form of drive and it was thrown out and steam or air put in its place. In reality, had the selection and installation of the motor been carried out by an electrical engineer instead of a steam engineer a large saving in cost and time would have resulted.

That the application of electric drive to contractors' machinery for use in our large cities where power is available results in a reduced cost of operation of such machinery, as compared with the use of steam or compressed air, has been demonstrated.

Application to Hoisting Engines

One of the classes of work to which the electric motor is particularly adapted is that of hoisting material from one level to another, either in excavation work or on building superstructures. One of the first advantages is the enormous saving in floor and head room required for an electric installation. The motor and controlling equipment take up but little more floor room than the ordinary hoisting engine. The head room required is only that sufficient to allow access to the controller and brake levers. The space required for coal storage and in some cases water storage is not necessary for the operation of the hoist and may be used to advantage for other work. Where real estate values are high, or where work is being carried on in cramped quarters, this large saving in space is worthy of consideration.

Another saving takes place in the reduction of wages of men to attend the hoist. The services of the fireman may be dispensed with where a motor drive is installed. The engineer, having no responsibility other than that of tending the hoisting equipment, is enabled to devote more time to keeping it in first-class condition. The time necessary to get up steam in the morning is saved as well as that taken to clean the boiler. This latter work having to be done between shifts is usually paid for on an overtime basis. The labor necessary to move the hoist from one location to another is lessened owing to a decrease in weight and size of the entire unit.

Independent of Weather Conditions

When the work is carried on during the winter months the amount of fuel required for a steam hoist increases as the weather gets colder, since in the majority of cases the hoist is in a more or less exposed location. The electric motor, on the contrary, maintains its efficiency independent of weather conditions, nothing short of a conflagration or a flood putting it out of business. With the steam hoist it is necessary to keep full pressure up during the whole of the working day and owing to the small portion of the time that the engine is working, the amount of the total power used in actual work is very small. It is here that the motor has a decided advantage. It takes power only while doing work and in proportion to the amount of work done. As the efficiency of a motor for this service is approximately ninety per cent. the contractor is paying for little more power than is delivered to his hoisting drums. The small engine usually used on engineering work of this kind is at its best very wasteful of steam and hence, with the boiler, has a very low overall efficiency.

Advantages on Various Work

For driving concrete mixers the service is continuous and the electric motor does not have such a decided advantage over the steam engine. The saving in labor and fuel as applied to the hoisting engine, however, is applicable to this class of load. For cranes, both of the derrick and travelling type, the electric drive has proved most suitable, and for permanent work such as dock handling, coal and ash hauling it has many loyal advocates. As compared with the operation of machinery by compressed air, the electric drive is again ahead in the point of efficiency. With the former equipment there is not only the loss in the compressor units but an enormous loss in the transmission pipes. Compared with the usual loss in the electric transmission line this is very great. Assuming an air engine of the same efficiency as the electric motor there is the loss in the compressor and pipe line to be charged against the air installation.

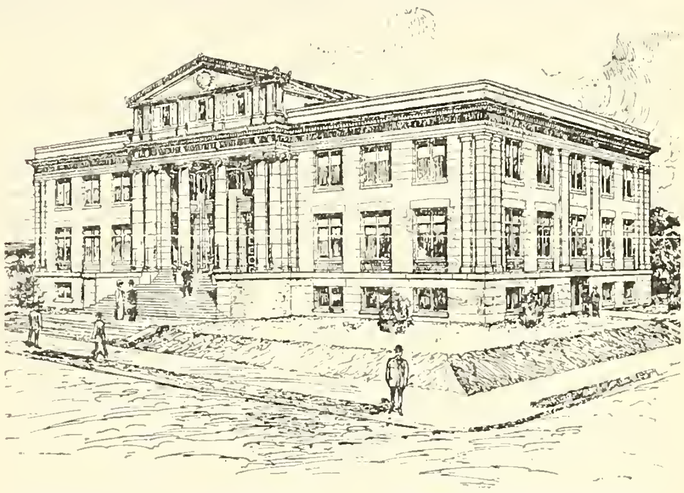
In large contracts for excavation work where a considerable number of drills are used, necessitating the installation of a compressor plant, electric drive, in many cases, has replaced steam. The saving in boiler and coal storage room, and in cost of attendance, is material. The electric installation also enables the compressor to be taken nearer to the work, which greatly reduces the losses in transmission, especially in underground work.

The question as to the relative merits of the different forms of drive is entirely a commercial one. The choice depends on the initial cost, the cost of operation, maintenance cost and salvage value of the machines upon the completion of the work.

It has not been the intention in the foregoing discussion to advocate the general replacing of the steam and air engine by the electric motor but to show that there are many instances where the latter with its silent, clean, reliable features is particularly adapted. The indications are that the next few years will see a more general acceptance of electric drive for contract work.

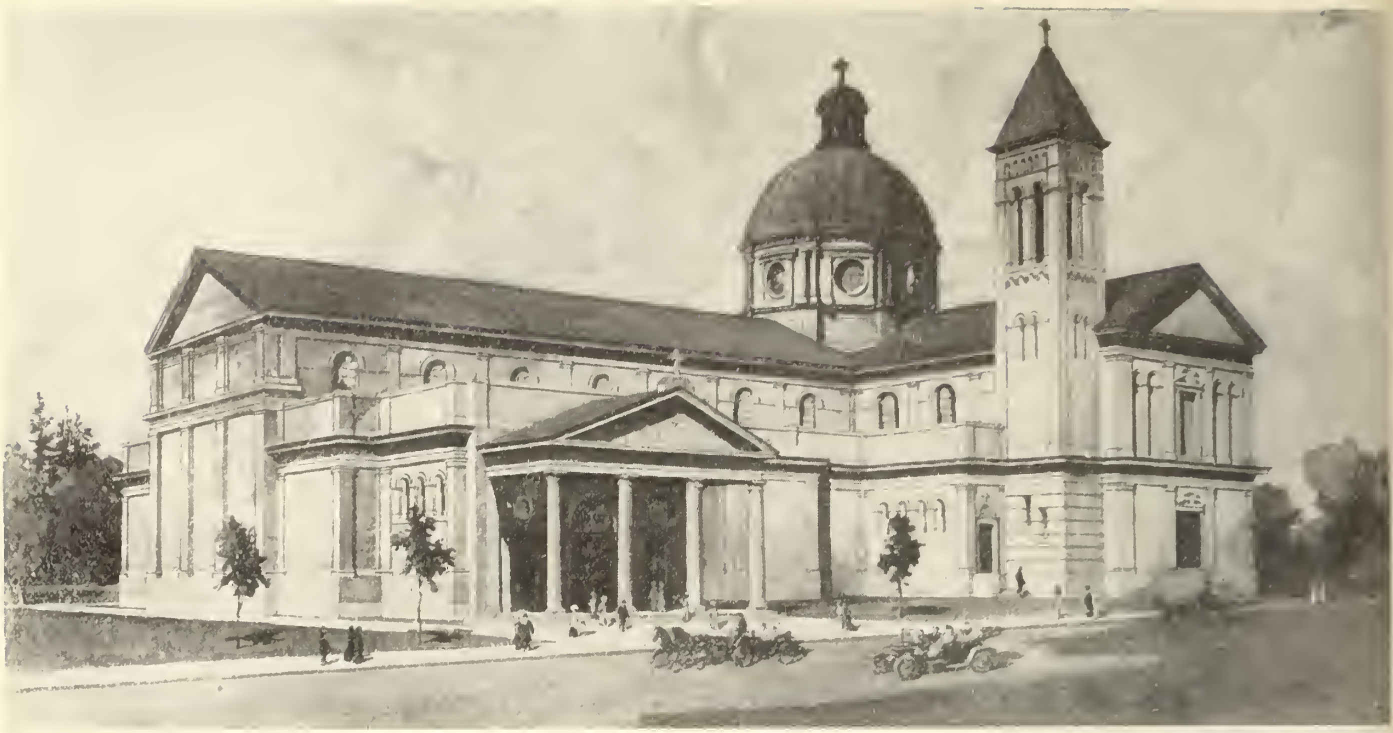
New Court House at Vernon, B. C.

This building, which is now under construction, was designed by Mr. Thos. Hooper, architect, Vancouver and Victoria, B.C. The estimated cost is $200,000 and the new Court House will be a valuable addition to the Government buildings of the province. The design is Classic, of the Ionic order, and the exterior is finished in gray and pink granite from local quarries. The building is of fireproof construction throughout, the interior being of reinforced concrete piers and floors, with exterior walls of granite. On the ground floor are situated the offices of the various public officials. On the first floor is located the Supreme Court Room. This room is approached from the ground floor by a wide and well lighted staircase and is forty-four feet long and thirty-two feet wide, with spacious galleries for the accommodation of the public. On the same floor accommodation is provided for the various officers of the Court. There is a large room thirty-two feet by seventy feet for the exhibition of horticultural products. Large fireproof vaults are provided on the lower floor. The principal offices and rooms are equipped with intercommunicating telephone service. The building is well lighted throughout by electricity. The heating is the Webster Modulating System. The corridors are finished with tiled floors and marble dados. Provision is made for the exterior illumination of the structure during public fetes and national celebrations.



Vernon, B. C., Court House. Architect, Mr. Thos. Hooper

Brantford, Ont., is anticipating something of a building boom this year. It is expected that the expenditure will be at least one million dollars.



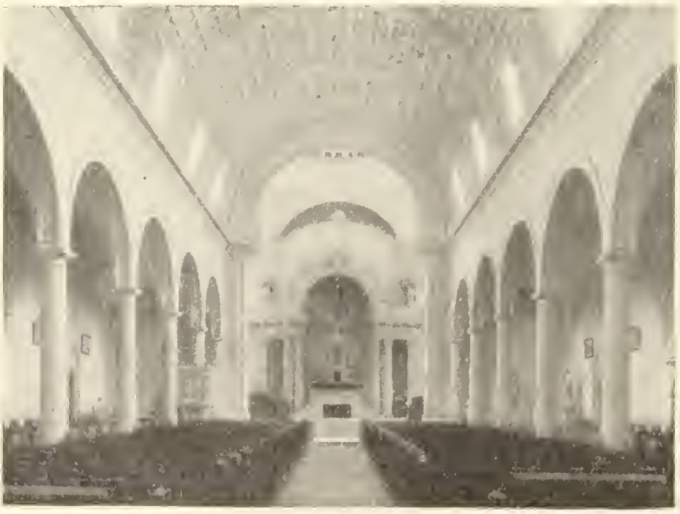
Church of Our Lady of Lourdes, Toronto

Character of Present Extension—An Interesting Architectural Problem and the Manner of its Solution by Mr. J. P. Hynes

THE above illustration shows the extension to the Church of Our Lady of Lourdes, Toronto, for which Mr. J. P. Hynes, of that city, is the architect. The general architectural style of the building is inspired by the Italian Renaissance. The construction is of white brick with Indiana limestone trimmings.

The original church seated less than three hundred persons, while the new extension, which is entirely for the use of the congregation, has a seating capacity of nine hundred, independent of the old church, which now forms the sanctuary.

The main entrance to the church, as extended, is from Sherbourne street, giving access through a spacious vestibule to the main body of the church which is divided by two arcades of seven arches each, forming aisles, which have a series of dome vaults, while the central portion has a coffered barrel vault penetrated by clear storey windows.



A View of the Interior

The vault and domes are of staff, while the columns, confessional fronts, dados and large piers under the domes are of Caen stone cement.

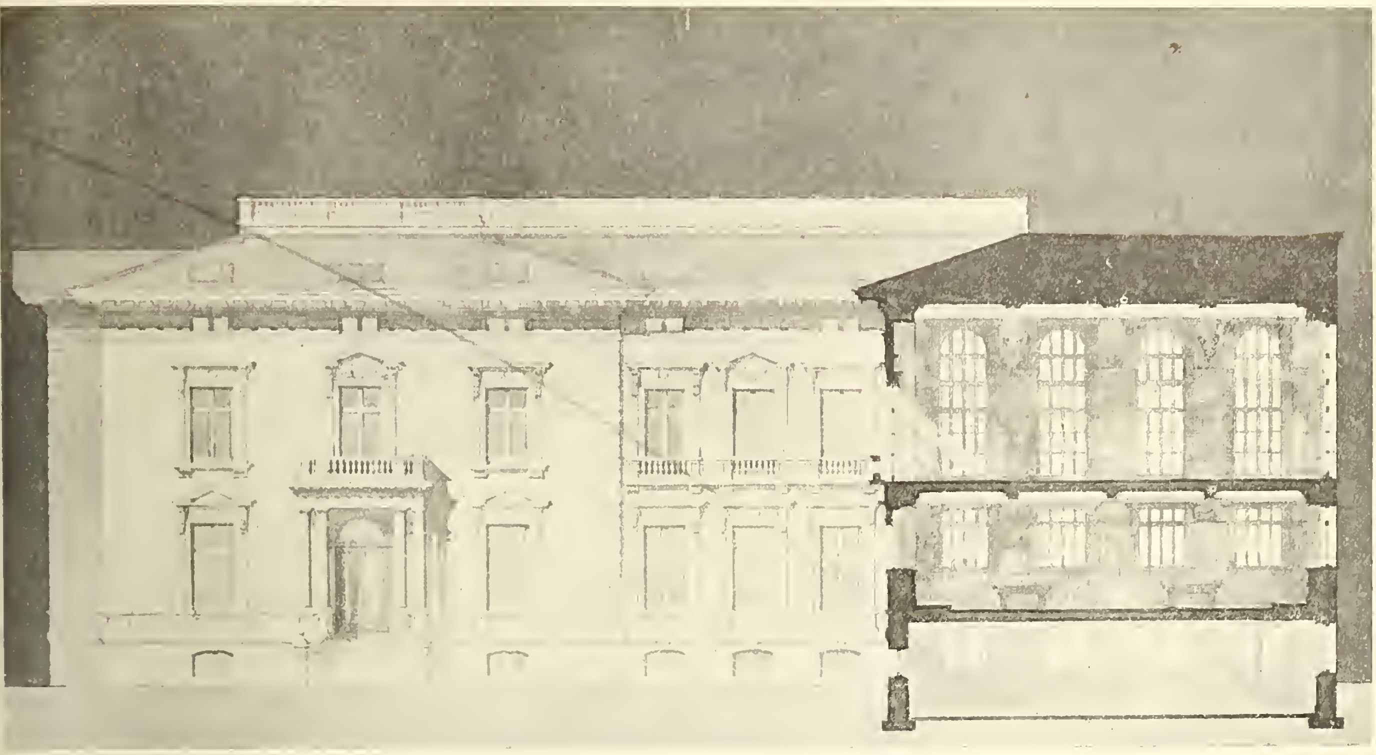
The Sanctuary is laid with a marble floor and the altar is surmounted by a colonnaded and arched baldacchino which is planked on either side by a semi-circle colonnade of similar design to the baldacchino practically encircling the sanctuary. The baldacchino and colonnades are also of Caen stone cement.

The pulpit is of marble in a solid block of verdi antique and skyros with onyx inserts, while the communion rail is also of skyros marble with red verona marble inserts.

The tinting of the church is carried out in very light lilac, buff and blue, giving a general warm tone together with a rather light and airy effect.

The church furnishings in the sanctuary, the pews throughout, as also all doors, are of quarter cut oak, fumed finish.

Egyptian stone workers 4,000 years ago had a surprising knowledge of what are considered modern tools. These pyramid builders operated with solid and tubular drills and straight and circular saws. In handling the tubular drills, which were of superior quality, the skill of the artisan was so remarkable that the cutting marks in granite show no indication of wear of the tool, while a cut of a tenth of an inch was made in the hardest rock at each revolution. A hole through both hard and soft material was bored perfectly smooth and uniform.

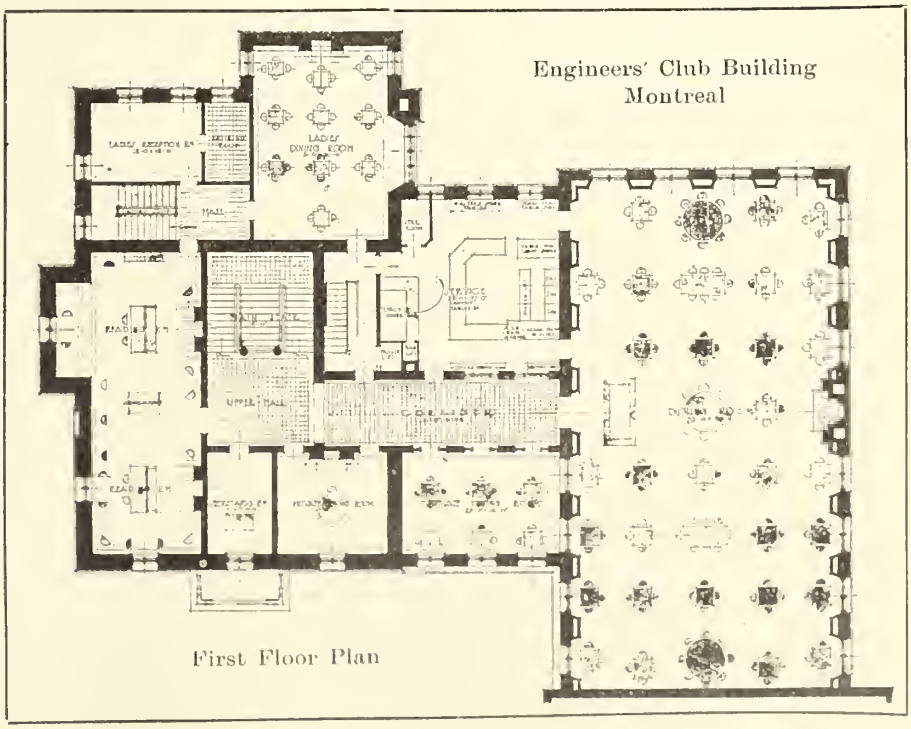


Engineers' Club, Montreal—Showing Proposed Addition to Present Building

Montreal Engineers Extend Club Building

Elaborate Arrangements—Accomodation will be Provided for 400 Members—Dining Room One of the Finest in the City

IN order to provide for their increasing membership, The Engineers' Club, of Montreal, have decided to enlarge their club-house on Beaver Hall Sq. The addition, shown in the above illustration, was designed by Messrs. Saxe & Archibald, architects, and will give, with the present building, accommodation for at least four hundred members. The general character of the extension will be in keeping with the present structure and will be of concrete faced with cut stone, the frame being of steel. The foundations are to be of concrete. In the old portion the stairway is to be remodelled, the new structure being three times the size of the present one. On the ground floor there will be a lounge, hall porter's office, writing room, a billiard room sufficiently large to accommodate twelve English tables, coat room, lavatory, service department, etc. The plans provide for a reading room on the second floor, secretary's room, private dining rooms, large club dining room (79 ft. x 39 ft. 6 in. and 22 feet high), service department, smoking rooms, ladies' dining room, and reception room. The principal dining room will have oak panels. In the attic there will be dining and card rooms, domestic accommodation, and a few bedrooms. The basement will contain a new kitchen, steward's office, refrigerator and boiler



Engineers' Club Building
Montreal

First Floor Plan

plants, storage rooms, etc. There will be electric and gas lighting, and forced ventilation. The plans for these extensions have been practically completed by the architects and operations will be commenced early this season.

Strengthening the Lower Chord of a Long-Span Roof Truss

IN an interesting paper read before the Institute of Civil Engineers (Great Britain), Mr. Wm. Dawson describes the manner in which auxiliary tie-bars were placed in the roof trusses of the railroad station at Birmingham, England, without in any way interfering with the use of the tracks and platform below. The trusses are of the bowstring girder type and are made up of rectangular arched ribs, vertical members with intermediate cross-bracing and 4-in. tie rods. They have spans of about 212 ft. and are spaced 24 ft. on centers. Subsequent to the failure of a tie-rod in a truss of the Charing Cross Station, which was of similar design but smaller span, the welded joints in the tie-rods of the Birmingham structure were first thoroughly cleaned and then given a rigid examination under a magnifying glass. Although it is stated that no serious defects were discovered, in view of the fact that certain possible conditions would cause an estimated stress of about 7 tons per square inch in the rods, the chief engineer of the railroad company, Mr. E. B. Thornhill, recommended that steps be taken to strengthen the structure. Additional reasons for this decision, it is stated, were the long period of time, somewhat over 50 years, to which the members had been subjected to the deleterious action of steam and gas from the locomotives, and the additional fact that the design of the truss was rather lighter than that of good modern practice. The estimated stresses in the ribs and bracing and their general condition apparently called for no attention, so it was decided to reinforce the tie-rods only.

As any obstruction of the tracks or platforms in the train shed, with falsework, was out of the question, it was necessary to suspend the erection scaffolding from the truss members. It was estimated that a scaffolding of adequate design to enable the handling of the auxiliary tie-rods, each of which weighed about 5¾ tons, would involve placing a load of about 24 tons on each truss, and thus about 26½ tons in the existing tie-rods. To avoid this condition, a steel wire hawser was suspended beneath each truss, supporting the scaffold and anchored to the truss-bearing shoes at either end. These hawsers were connected at each end with long screws passing through heavy helical springs, which were nested in a channel bar bracket bolted to the truss shoes. By means of the screws and calibrated springs the desired tension was placed in the hawser to provide support for the suspended scaffolding and thus prevent undue stressing of the existing tie bars.

This scaffolding extended over two bays and thus enabled the placing of three auxiliary tie-rods without moving it. It was built out from either end of the truss to insure symmetrical loading and was made up of longitudinal and transverse trussed members rigidly connected and supporting three independent lower scaffolds or gangways. The latter were connected with wire guys and were each made up of 12 similar sections or units, provided with adjustable bolts and nuts for rigidly connecting them and allowing for adjustment on account of slight inequalities in the spans. Heavy sheets of canvas were suspended below the scaffolds while work was in progress. The new tie-bars consist of two flat steel plates, 6 in. wide and ¾ in. thick, which are placed on edge with a space of 1½ in. between them. They are located about midway between the old tie and the springing line and are supported by pairs of 1⅛ in. rods hanging from brackets anchored on each side of the arch ribs. These rods are placed adjacent to the vertical members of the truss and are equipped with screwed ends for adjusting purposes. The tie-bars were delivered in sections with cover plates riveted on one end and with holes drilled in the cover plates for the adjacent section in which no holes were provided. The latter were drilled in place, the joints were riveted up with pneumatic riveters and the desired camber to the tie-rods was secured by adjusting the hangers.

These tie-rods were anchored to the truss section by means of 2¾-in. steel pins, passing through the entire thickness of the web plate, and the cast-iron packing forming the splayed portion of the main rib. Castings were made and fitted to the shoes of each truss and the new tie-bars. In drilling the holes for the pins it was necessary to use the greatest of care, and after boring a preliminary hole and placing the supporting castings a special boring rig was carefully adjusted and reamed out the 22 in. of hole required. The pins which were provided with pilot nuts were forced into these holes with jacks.

With the tie-bars in place it was necessary to ensure an initial stress in them before rigidly connecting them with the truss sections. This was accomplished by means of a secondary steel pin passed through the tie-bar plates and connected with an adjusting gear of screws and calibrated with an adjusting gear of screws and calibrated springs. Simultaneously with the stressing of the tie-bars the steel hawser screws were tightened and then the joint between the tie-bars and the truss member was driven. Before the adjusting gear was dismantled the end of the roof truss was lifted from the cradle, in order to make sure that no stress put upon the springs had been transferred to the columns. This lifting was accomplished by means of a specially designed derrick, a weight of 42 tons being lifted at a height of about 35 ft.

With the joint completed and the truss in place, it is stated that the resultant shortening of the old tie-rods caused a slight buckling of the cross bracing in the main trusses. It is estimated that the unit stress in the old tie-rods has been reduced about one-third by the auxiliary rods and the compression in the arched ribs has also been reduced on account of the increased depth to the structure as a whole.

The use of copper sulphate to destroy micro-organic growths in the water supply of Newark, New Jersey; was commented upon by Mr. Morris R. Sherrerd in an address at the recent annual meeting of the New Jersey Sanitary Association in Lakewood. Newark, he said, has been troubled most by the presence of synura, and it has been found advisable to use one part of copper sulphate to 6,000,000 parts of water. In applying the chemical the former practice was to place the copper sulphate in feed bags and allow them to drag in the streams at the end of a rope, but the newer method is to dissolve the chemical in water and apply the solution to the streams.

The Rehandling of Concrete Materials

Up-to date Methods and Modern Devices mean Greatly Reduced Cost — Arrangement of Stock Piles — Selection of Equipment

By Daniel J. Hauer

THE great uncertain cost in concrete construction is that of mixing and placing the ingredients. This is generally known as a "labor item," since labor enters materially into the cost. When a mixer is used, however, the cost of storing and handling the ingredients is more than fifty per cent. of the cost of mixing and placing. Accordingly, instead of being included in the labor cost, storing and handling are now coming to be known under the general head of "rehandling concrete materials," and no matter whether the job is large or small, this has become an item of the utmost importance. Done by old-fashioned methods, the cost of rehandling is bound to be excessive, but if modern devices and methods are used, the cost per cubic yard should not amount to more than a few cents.

In order to do a large amount of work, it is absolutely necessary to store the materials. That means that they must be handled twice, first to the storage piles, and then from the piles to the mixers. The problem is to re-handle the material as quickly and cheaply as possible. If the job is a small one, the rehandling must be done by improved methods and devices, while if the job is large, machinery must be employed. Obviously, expensive machinery cannot be installed on small jobs, but there are many convenient tools and appliances that can be used on jobs where there are less than one hundred cubic yards of concrete.

Ten years ago the ordinary method was to use the ordinary contractors' wheelbarrow, both for charging the mixer and carrying away the concrete. The various ingredients were piled or stored close by, and a platform was built, on which the barrows were run to the mixer. This method was used, not only for small jobs, but for the many large ones. At the present time, however, these high platforms are seldom used; for nearly all mixers are, or can be, equipped with a charging hopper or like device, and the best of them admit of barrow dumping from the ground.

The ordinary wheelbarrow is an expensive agent for handling either concrete or the materials for making it. One barrow will only hold two or three cubic feet of crushed stone and sand, and will not carry more than a cubic foot of wet, sloppy concrete without spilling and wasting it. Accordingly the common wheelbarrow as a conveyor for mixed concrete has been almost entirely replaced by the two-wheeled buggy. For this, a good wide roadway must be provided, and many contractors, accustomed to the single plank runway used for barrows, were formerly unwilling to spend the extra money needed for the wide runways. This was an economic blunder, as even the worst contractors now realize. For charging, a deep wheel-barrow, which is known as a charging barrow, and will hold from five to six cubic feet is now used. These wheelbarrows are economical for small jobs and under some conditions for jobs that require the handling of a large amount of materials.

Under no circumstances can the materials be handled in the most economical manner unless the stock piles are arranged properly. In the first place, if it is necessary to rehandle the materials with shovels before putting it into the stock piles, a substantial platform should be made upon which to place the sand and aggregate. Cement should always be stored in a well-built house, excepting when it is received daily on the job in quantities that can be used before the next day. Then only a platform is needed, with a good tarpaulin to cover it in case of a shower.

If boards are laid down under the stock piles there is not only less material wasted, but much money saved in rehandling. When shovels are used the men should not be allowed to dig into the sides of the piles, as large shovelfuls are seldom gotten in this manner, but they should be taught to shovel along the bottom, thus getting heaping shovelfuls. The kind of shovel used should always be given consideration. For sand, a small-sized scoop shovel is the most economical, for with it, a large shovelful can be handled whether the sand is dry or wet, while with a flat shovel, but little dry sand can be picked up. For the aggregate, fine, that is, if composed of one-inch material or less, a wide, flat square-pointed shovel or a scoop should be used, while for coarser materials, a round-pointed shovel may be found better adapted to the work. The idea that any kind of shovel is adapted to any kind of work is a thing of the past. Experiments should be made with several sizes and styles of bowls, in order to find the one which will give the best results. For two and three-inch crushed rock, stone forks should be used; but they seldom are, for boards are not laid down under the stone, and good results are not obtained with forks when thrust into the side of the pile. Then, too, even if boards are laid down, the men object to the forks, since the load they have to carry is so much greater. However, with the proper method of handling men, their objection to forks can be overcome.

To Prevent Waste of Material

Stock piles, especially of stone, when the materials are delivered on the job in wagons, are generally over a large area. This is due to the fact that even with bottom-dump wagons the horses cannot pull the wagons to the top of the pile after one or two loads are dumped, and the wagons do not dump free, unless the doors are especially arranged for this purpose. In order to get a high or condensed pile, shoveling of the material must be resorted to, and since this is expensive, it is seldom done. The wagons continue to scatter the loads and grind a fair amount of the material into the ground, and not only is the material wasted, but the cost of taking it to the mixer is considerably increased. This can be overcome in several ways, even on jobs of medium size, and on small jobs. If any part of the ground around the structure to be built is higher than the rest a small hole can be excavated, and a hopper-shaped bin built, with its top covered with a trap through which the wagons may dump the material. Then a chute running to the lower ground on which the mixer is placed can be built to carry the material to a pile near the mixer. Often a bridge can be used to dump from and for buildings in cities the usual method is to place the mixer in the cellar and then to dump the materials from the street.

When the ground is level a platform can be built with a runway at each end for the dump wagons. The sand and aggregate can be dumped from this platform and stored under it. With end dump wagons many methods of keeping the material in good piles can be devised. There are one or two makes of dump wagon bodies that can be raised off their running gear, and when these are used it is possible to raise them by means of a derrick and dump the piles over a limited area and in a cone-shaped heap, which is much desired, for as the material is picked up from the bottom, more keeps sliding down the pile.

Economy of Clam-Shell Buckets

One of the best and most economical means of handling concrete materials is the clam-shell bucket. This can be used whenever derricks, locomotive cranes, cableways or any hoisting devices are used on the jobs. In hundreds of cases it pays to set up a derrick for this purpose, and when a clam-shell bucket is employed a double drum hoisting engine can be installed for handling both derrick and bucket, if a counter balanced drum, which can be attached to any hoisting engine, is used. This drum saves one and sometimes two men.

Clam-shell buckets can be used to unload cars of stone, gravel or sand, and the material can be handled with them directly into stock piles or loaded into small cars or wagons. If, however, cars are to be unloaded by hand, a patented box that can be atached to the side of a car can be purchased and the material can be shoveled into this box, which dumps directly into the wagon. This is a time saver with teams, as a wagon is loaded instantly and does not have to wait until the laborers shovel out the load. Thus the same number of teams can haul a much greater yardage each day. Another method of unloading cars, not so effective in saving team time, but one that reduces the cost of shoveling, is to have a platform from ten to twelve feet long, and about eight feet wide. If built of boards this can be handled by three or four men. It is placed on the rails below the drop doors of the hopper of the cars, and the edges are blocked upon the ties. Then the doors of the hoppers are opened and the men shovel the material from the platform into wagons or carts. Not only concrete materials can be handled in this manner, but also coal and many other substance that will dump by gravity.

If the materials are brought onto the jobs in wagons, clam-shell buckets can be used to place them in stock piles, by first dumping the wagons into a hopper or pit and then rehandling them by means of the buckets. The cost of rehandling with a clam-shell is only a few cents per cubic yard.

Feeding bins are often placed above a mixer and the concrete materials taken from stock piles and placed in the bins. Clam-shell buckets are useful for this purpose, but if they are used the tops of the bins should be made to slant toward the hoisting operator, in order to enable him to see where to dump his bucket, so as not to mix his materials. Sand should be stored on the low side of the bins nearest the operator. The other side will have a much greater storage capacity and should be used for the aggregate.

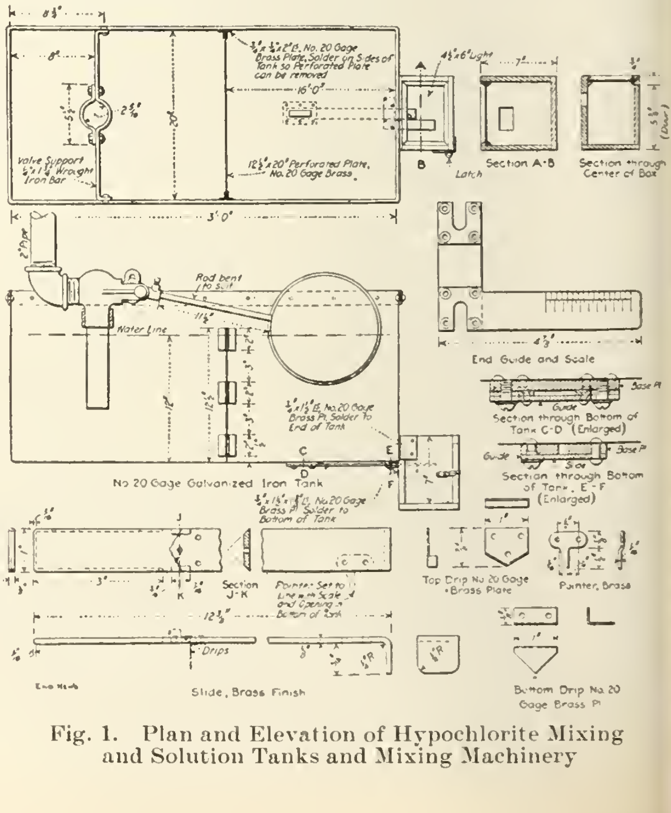
Clam-shells can also be used to unload scows, barges and sailing-vessels. In building piers and other structures in deep water, derricks equipped with clamshells can be mounted on scows and used to unload the barges, while other derricks equipped with concrete buckets, can place the concrete. This is one of the most economical methods of mixing and placing the concrete for this class of work.

A great mistake on many jobs, both large and small, is to store the concrete materials, the steel, forms, lumber, etc., too close to the mixer and the work. It is true that on some jobs space is limited and things must be placed close together, but some contractors seem to think that if they work under cramped conditions upon one occasion they must use the same layout again. On the other hand, it is wasting time and money to spread the outfit and materials over too large an area, but there should always be ample room to do the work and to store the materials in sufficient quantities so as not to delay the work. —Cement Era.

A Temporary Hypochlorite Plant

THE health department of Cleveland, Ohio, having been of the opinion, in 1911, that the water supply of the city required disinfection without delay, the water department erected a temporary plant which was put in operation on Sept. 11, 1911. The plant is described in The Engineering News by Mr. C. F. Schulz, Superintendent and Chief Engineer, Division of Water Supply and Electricity, Cleveland.

The plant is housed in a two-storey frame building 28 x 38 ft. in plan. It consists (Fig. 1) of two 45,000-lb. wooden solution tanks 11 ft. 8 in. diameter at the bottom, 11 ft. 5 in. diameter at the top and



Valve Support
Iron Bar
12½"x20" Perforated Plate, No. 20 Gage Brass
Section A-B
Section through Center of Box
Latch
Water Line
Rod bent to Suit
End Guide and Scale
Section through Bottom of Tank C-D (Enlarged)
Section through Bottom of Tank E-F (Enlarged)
No 20 Gage Galvanized Iron Tank
Section J-K
Top Drip No 20 Gage Brass Plate
Pointer, Brass
Drips
Slide, Brass Finish
Bottom Drip No. 20 Gage Brass Pl.
A
B
C
D
E
F

Fig. 1. Plan and Elevation of Hypochlorite Mixing and Solution Tanks and Mixing Machinery

7 ft. 4¾ in. deep, placed on timber posts so that the bottom of the tank is at a height of 6 in. above the main floor of the building inclosing the same. Above these two solution tanks is placed a 270-gal. mixing tank, 4 ft. 2 in. in diameter at the bottom, 4 ft. diameter at the top and 3 ft. 4 in. deep. This tank is of wood, but is lined with an acid-proof bitumastic enamel, to protect the wood from being eaten away by the chlorine. The mixing tank is equipped with a stirring device, operated by a 3-h.p. gasoline engine.

Below the solution tanks are two small galvanized iron rectangular orifice tanks. From these orifice tanks a 2-in. pipe extends to a shaft and a tunnel supplying the pumping engines.

The mixing tank is supplied with water from the city main through a 2-in. pipe equipped with a meter for measuring the quantity of water used, which is further checked by float gages in the solution tanks, indicating the quantity of water in the tanks. This 2-in. pipe enters the mixing tank from below. From a point about 6 in. below the top of this mixing tank two 4-in. pipes extend, equipped with valves and so arranged that the water can be discharged alternately into either solution tank. Two-inch discharge pipes are connected with the solution tanks at 6 in. above the bottom and terminate at the orifice tanks (Fig. 2). The openings of these discharge pipes are equipped with float valves so as to maintain a uniform head of water above the discharge orifices in the orifice tanks. A 4-in. drain pipe is connected with each solution tank for draining the same and removing the sediment.

The orifices consist of brass plates (Fig. 2) into which rectangular openings ½ in. wide have been cut. The length of these openings can be varied by means of brass slides equipped with pointers traveling over a brass scale. The orifices were calibrated to read in pounds of solution discharged per minute by means of a ⅝-in. water meter in the supply pipe to the orifice tanks. The water level was kept constant and 12 in. above the orifice slide. Assuming the weight of 1 cu. ft. of water at 62.4 lb., the following rates were observed and marked:

20 lb. per min. = 1 cu. ft. in 3 minutes 7 seconds.
30 lb. per min. = 1 cu. ft. in 2 minutes 5 seconds.
40 lb. per min. = 1 cu. ft. in 1 minute 34 seconds.
50 lb. per min. = 1 cu. ft. in 1 minute 15 seconds.
100 lb. per min. = 1 cu. ft. in 37.5 seconds.
130 lb. per min. = 1 cu. ft. in 29 seconds.

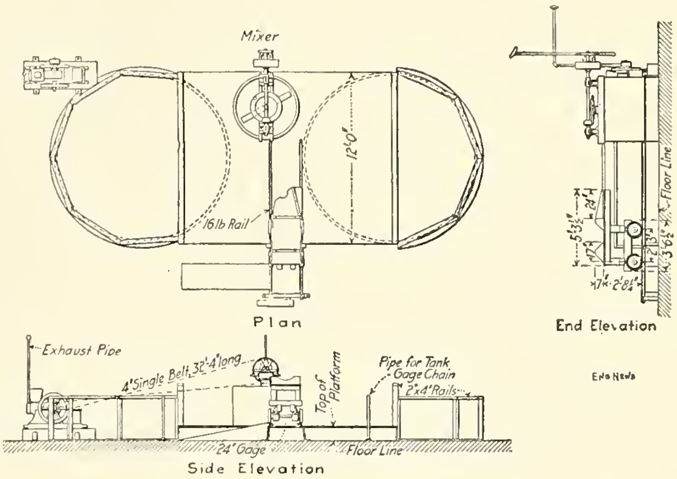
The scales were marked in 10-lb. intervals from 0 to 150 lb. per minute. Assuming that the strength of the solution be 0.0037 available chlorine and that we wish to add 0.7 part per million gallons of water pumped, the amount of solution to be added per minute for a pumpage rate of 100,000,000 gal. per day would be

$$\frac{100{,}000{,}000 \times 8.34 \times 0.0000007}{24 \times 60 \times 0.0037} = 109.6 \text{ lb. or}$$

1.096 lb. per million gallons per day.

In preparing a solution and delivering the same to the water in the tunnel, the method of procedure is as follows: Water enters the mixing tank at the bottom at the rate of about 100 gal. per minute, discharging at this rate through the 4-in. overflow pipe into the solution tank. The chloride of lime is added to this mixing tank at the rate of about 8 lb. per minute, the water in the mixing tank being very thoroughly stirred by means of a stirrer driven by the gasoline engine. One drum of bleaching powder is weighed and mixed at a time and the quality of water passing through the mixing tank and discharging into the solution tank is governed by the weight of the bleaching powder so that the solution shall contain 1 per cent. of the powder or approximately 0.37 per cent. of the chlorine. The drums average about 350 lb. of bleaching powder each, which corresponds to 35,000 lb. of water. About one hour is required to add this quantity of water.

After standing in this solution tank for a period of about five hours, or during the time required for the emptying of the other solution tank, and when the other solution tank is empty, the solution is discharged from the solution tank into the orifice tank and from the orifice tank to the tunnel and here mingles with the water in the tunnel. A portion of the water containing the solution goes to a 15,000,000-gal. pump, in a temporary engine house, but most of it flows through the gate and screen wells and through the aqueduct and pump wells to the pumps in the main building.


Plan

End Elevation

Side Elevation

Fig. 2. Details of Orifice Box

Outside of the engine house and west of it is a header with which all of the discharge pipes of the pumps connect, so that if the mixture entering the various pumps should not be of uniform strength this defect is overcome in the header. After leaving the header the water is forced through two 48-in. discharge mains extending from Kirtland Station to the distribution system. Each of these mains is equipped with a check valve at a point about 815 ft. from the station, where it is again subjected to agitation so that there can be no doubt but that the chlorine is uniformly distributed in the water after it leaves the pumping station and passes through these check valves.

At present three pumps, with a total capacity of 65,000,000 gal., take water through the aqueduct. About June, 1912, the 15,000,000-gal. pump will be shut down and new ones put in use. This will bring the pumping capacity up to 100,000,000 gal. a day.

The plant was built under the general direction of Mr. Leslie C. Smith, who at that time was superintendent of the Water Division of the Department of Public Service, Cleveland, Ohio.

Concrete water barrels are being employed experimentally in the provision for fire protection of trestles on the Nashville, Chattanooga & St. Louis Railway. It is stated that they have shown no loss of water except by evaporation.

Pneumatic Caissons in Foundation Work

Application of this Method in Sinking Piers for Large Buildings —Various Installations Described—Practical Advantages Outlined*

By Alexander Allaire

THE modern large city has brought with it the burden not only of political and social problems, but also many of an engineering nature as well. These last, by reason of their diverse nature, have required special treatment. Thus, for example, the tall building, made necessary by the congestion of business centres and the consequent appreciation of realty values, has called for an amount of study which cannot be measured by the comparatively few years it has been in existence. This is further exemplified by the fact that the superstructure and foundation are developed by different and almost distinct classes of engineers. Both classes of work have their interesting features, but as the above subject denotes, the latter only will be dealt with, more especially as applied to pneumatic caisson work for carrying the piers of buildings to rock.

For the benefit of those who have not been brought in contact with this work, it might be well to state that caissons are air-tight chambers, circular or rectangular in plan, having a roof and walls but no floor. On the ceiling of the chamber is superimposed the mass of the pier to be. Through this concrete runs what is known as the shaft, which, connecting the working chamber with the ground above, permits the passage to and fro of men and materials.

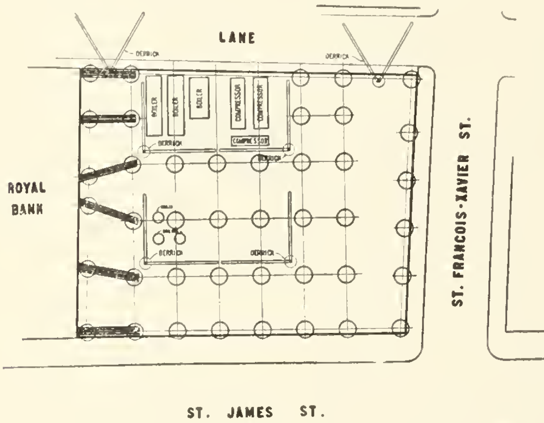


Fig. 1—Site of Dominion Express Building, Montreal

When the caisson reaches the water line in the ground, air is forced into the working chamber. This being maintained at the proper pressure holds the water down to the level of the bottom of the surrounding walls or cutting edge, and prevents the inflow of the quicksand. To retain the higher pressure of air in the working chamber and yet at the same time permit the men and excavated material to enter and leave the caisson, what is known as an air-lock is used. This is an intermediate stage between the atmospheric and the higher pressure. It consists of a small room surmounting the top of the shaft with a door in the ceiling and one in the floor, one of which is at all times kept closed to prevent the loss of air from below.

The caisson is sunk by undermining. This is aided by the weight of the concrete over the roof and also by the addition of pig-iron. The excavated material is hoisted out in buckets, usually handled by a derrick. When the caisson finally rests on rock, and same has been carefully cleaned off, the working chamber and shaft are filled with concrete, and the pier brought up to the proper grade.

The early type of caisson consisted of a working chamber with walls and roof of heavy timber. On this was placed the cofferdam, also made of wood, but later modifications introduced steel plates in the place of the timber. On the roof of the working chamber was placed the shafting and the space between it and the cofferdam was filled with concrete.

The first step in development of the caisson was to eliminate the heavy timber roof. The first modification, therefore, was in the form of a removable steel roof or deck. This tended to increase the life of the job and also the cost of the work, because it necessitated postponing the concreting of the upper portion of the pier until last and the handling of an additional amount of pig-iron to weight the caisson down.

A strong desire on the part of the engineers engaged in this class of work to lessen and to increase the speed resulted in the designing and patenting by the Foundation Company of a method whereby the roof of the working chamber and also the cofferdam were eliminated. The former resulted in an unbroken shaft of concrete from the rock up to the underside of the building columns.

This was soon followed by another patented device of the same company, which enabled the shafting to be recovered, and finally by a further design of caisson which eliminated the timber walls of the caisson. This shafting is of a collapsible type, so that after the caisson is landed on rock and the working chamber filled with concrete, the lengths of the shafting are successfully collapsed and withdrawn; the opening is then filled with concrete, and the pier brought up to its proper grade. It might further be stated that this shafting is divided into two compartments, a manway and a bucketway, the idea being to afford opportunity to the men to go up and down the shaft without any danger of being struck by the bucket.

A short description of the installation of the foundations of the Dominion Express building, in Montreal, will give an illustration of one of the types of caisson construction.

The Express Building, rising ten storeys above St. James street, has, in addition, three floors below the street—the deepest basement being 35 ft. below the curb. The approximate dimensions in plan are 120 ft. x 95 ft.

Fig. 1 shows the plan of the lot. The total number of caissons sunk was forty-two. On account of the columns along the Royal Bank being very close to that building line, it was impossible to sink these caissons so that their centres would be directly under the centres of the columns. They were, therefore

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[*] Paper read before the Canadian Society of Engineers.

set back the necessary distance to clear the wall and the columns cantilevered by means of girders composed of 24-in. I-beams extending from these caissons to those in the next row from the building.

The six derricks used in building up and sinking the caissons, were spaced as indicated. This gave a complete command of the lot. The boilers and air compressors were located as shown.

Fig. 2 is a typical section of the caisson used. Owing to the fact that the change in the foundation construction added considerably to the length of time necessary for the work, the contractors endeavored to cut this time down as much as possible. The cofferdam type was therefore used, that is, the piers were encased in a shell of wood, thus eliminating the delay of waiting for the concrete to set before stripping the outside forms, which, owing to the winter weather, would have taken several days. As a further precaution against the freezing of the concrete, salamanders were hung in the shaft after the concrete was deposited.

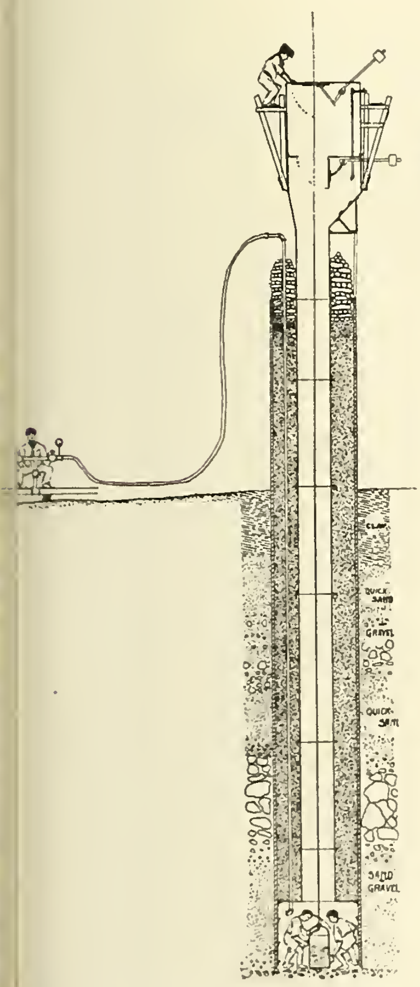

Fig. 2—Typical caisson, Dominion Express Building, Montreal.

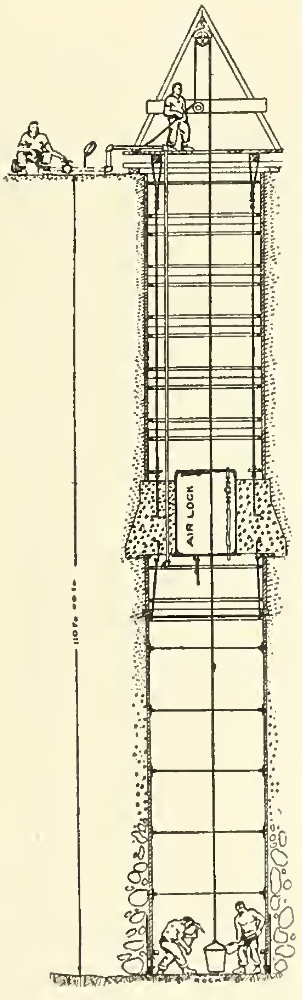

Fig. 10—Method of excavating employed in the foundation work for the Chicago and North Western Depot.

The sketch shows, in addition to the principal caisson features mentioned before, the air lines leading down to the working chamber. It also shows the gauge tender, who, by means of a valve, regulates the pressure of air to be maintained. These air lines have at their lowest ends, in the working chamber, what are known as clapper valves, which automatically close in the event of a break in the lines, thus preventing any rush of air back through the broken pipe, and enabling the sand hogs to escape by means of a ladder in the shaft.

One of the biggest factors in connection with the work was the shoring of the Royal Bank Building (Fig. 3). This was handled as follows: a continuous plate girder 42 in. in depth was bolted to the wall columns of the building for its full length, and under this were placed 12 in. x 12 L.L.Y.P. pushers. Daily readings were taken with a level and adjustments made by elevating the pushers.

The increasing value of properties in New York is resulting not only in the increased height of buildings, but also in the ground below the level of the street being utilized as well. On account of the water level in the soil being at no great distance below the surface, this adds to the difficulty of installing a foundation. Practically all the skyscrapers in the lower part of New York are on pneumatic caisson foundations. Naturally almost every building has its own peculiar needs, so that the actual methods varied greatly. One example of this type of construction will be found in the Trust Company of America Building. At this site, considering the curb elevation 0 ft., the water level was—12 ft., general excavation —34 ft. and rock—50 ft.

Fig. 4 shows the general foundation plan. The lot was cofferdammed by sinking pneumatic caissons end to end around its perimeter. The joints or open spaces between the ends of the caisson were next pneumatically excavated to rock and concreted, thus giving a continuous water-tight wall of concrete around the property. The centre of the lot was then excavated and the piers for the interior columns sunk by the open method.

The property to be taken care of, while the work was progressing, consisted of the nine-storey U.S. Trust Company, on the east side of the lot, and the ten-storey Mills Building on the west side. The south end of the lot was bounded by the Wall Street Exchange Building—a former contract of the Foundation Company, and as this rested on pneumatic caissons, it needed no attention. On account of the caissons being located so as to form a continuous line along and close to the walls of the adjoining buildings to be shored, it was impossible to take care of these buildings by needles or inclined pushers. The weight of these self-supporting walls was also an important factor. (Fig. 5).

The shoring was done by sinking 3 ft. diam. pneumatic cylinders at fixed intervals, directly below the walls. This was performed while the building on the site of the work was being demolished. The sketch illustrates clearly how this was done. By means of I-beams, steel plates and wedges, the weight of the building was transferred to these cylinders. The shoring cylinders and the wrecking of the building being completed, the work of sinking was started.

Fig. 6 shows the walls of the adjoining buildings supported on shoring cylinders, a caisson in the process of sinking and also a completed caisson. One of the company's 4-boom travellers may also be seen in outline. This having booms of 50 ft. in length and being capable of moving along tracks laid on trestle bents, made possible the building of the caissons up to the required height before sinking.

The photograph shown (Fig. 7) gives an idea of several stages of the caisson work. The nearest box is a caisson completed, except for bringing the concrete up to grade and setting the grillage. The next one is a caisson partly sunk; while along the same line in the back is one built up ready for its downward journey. Formerly, the necessary weight to sink the caissons was secured by adding pig-iron to the tops of the concrete, but about five years ago, the Foundation Company modified this by having made cast iron blocks which weigh about 3,000 lbs. each. These having recessed eyes cast in their sides, can be handled by derricks, thus cutting down the time and cost of weighting the caissons. The blocks may be seen piled up on the top of the caissons mentioned as being sunk.

The work of sinking the exterior caissons having been completed and the joints sealed, the lot was excavated down to the elevation indicated (Fig. 8) the wall caissons being carefully cross-braced as this proceeded. As mentioned before, the fact that the water was all shut off by the outside row of caissons permitted the interior piers to be carried down by the ordinary sheet-pile method.

Fig. 9 illustrates a section showing the completed foundation with some of the steel work set. This affords the owner two floors below the street level. In one of the Foundation Company's more recent contracts, known as the Bankers Trust Co., at the corner of Wall and Broad streets, the interior excavation was carried down about 60 ft. below the curb, thus giving several more sub-basement floors.

In the foundations for the Chicago and North Western Depot, there is a wide departure from either of the types just mentioned. The building was figured to be carried on concrete piers, varying in size from 4 ft. 6 in. to 8 ft. 0 in. diam.—these piers to be founded on rock. The soil at the site of the depot was to a certain depth typical of that usually encountered in Chicago, viz., first about 10 ft. of filled ground, then 70 to 80 ft. of blue clay which while fairly plastic at the top gained in stiffness as the depth increased. Below this clay was a stratum of hard pan, 10 to 15 ft. thick. Beyond this point, the material was quite unusual, consisting of quicksand, gravel, and masses of densely packed boulders, the water in same extending up to the hardpan.

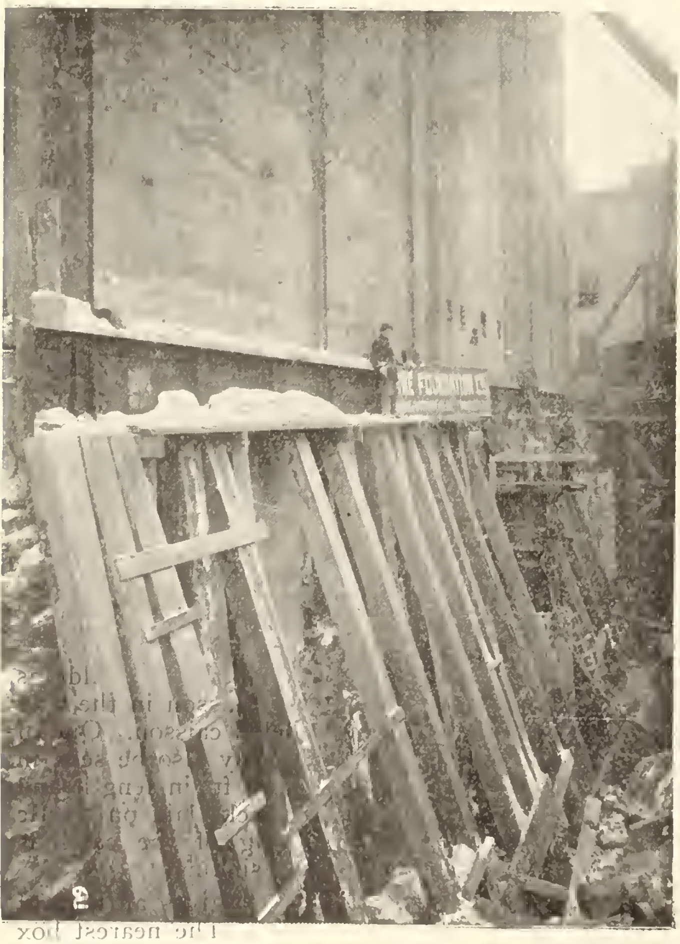

Fig. 3—Shoring the Royal Bank Building, Montreal

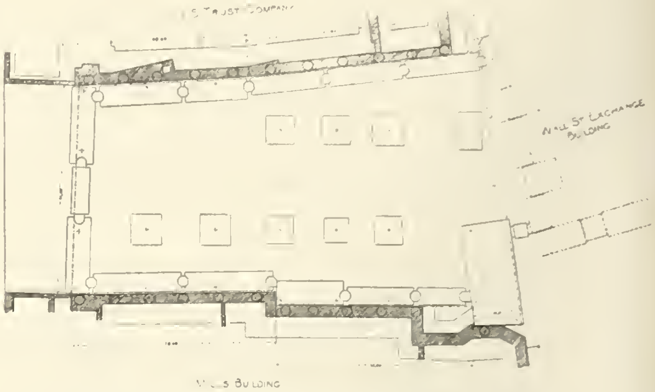

Fig. 4—General foundation plan, Trust Company of America Building, New York City

After several attempts to reach rock by the open method through this material had failed, it was finally decided to use compressed air.

Inasmuch as no difficulty was experienced in excavating in the open down to the water level, it was deemed advisable to use this method as far as possible. This work was excuted in the customary manner, the excavated well being lined with 3-in. lagging. Arriving at the water level in the soil, the open method was discontinued and preparations made for the compressed air work.

Fig. 10 is a typical sketch of how the balance of the pier was excavated.

The first operation was to take out the last ring of lagging put in by the open method and enlarge the diameter of the hole. A steel shield built to the proper dimensions and approximately 4 ft. in height was then lowered section by section and assembled. Next, the section of lagging about 5 ft. above the top of the shield was removed and the material excavated back a distance of 2 ft. all around the circumference. A temporary platform being laid, a collapsible air lock was concreted in as shown, the concrete deck further supported by wire cables carried to the mouth of the well and fastened to 12-in. x 12-in. timbers spanning the opening.

After the concrete had been allowed time to set, the air was turned on and the sinking proceeded. This consisted in jacking down the shield as the excavation proceeded and lining back of it with lagging. The lagging was made in sections 2 ft. high, built of 3-in. T and G maple and angle iron rings. These angles being suitably punched on the horizontal flanges, the new section of lagging could be bolted to the set already in position whenever the shield was far enough in advance to permit of the necessary clearance.

After the excavation had been carried to rock, the pier was concreted up to the outside of the air-lock, and the lock was collapsed and removed—the pier then being brought up to grade.

One of the most pronounced difficulties encountered in installing foundations for the modern tall building is the confined space in which the operations usually have to be carried on. The properties in a dollar sense may be large, but usually in actual area they are not. The necessary plant to handle the work is always great and when there is added to this the interchangeable concrete forms, shafting, pig-iron, etc., it is evident that a great deal of careful planning is required.

To illustrate how large a factor is constituted by plant, etc., two different buildings have been selected —first, the Singer Building, which may be considered a job of average size, and second, the new Municipal Building, at the entrance to the Brooklyn Bridge.

A general view of the Singer Building while the foundation work was progressing is shown in Fig. 11. Owing to the building fronting on Broadway, on which no material can be piled nor teams allowed to stand, it was necessary to floor over the whole lot at the level of the street in order to be able to handle the incoming material and the spoil from the caissons.

On this work the larger items of plant were as follows:—

1 4-boom traveller complete with 4 double drum hoisting engines, 4 independent boom swingers, etc.; 2 5-ton stiff leg derricks with hoisting engines, etc.; 2 large air compressors with a total of 500 h.p.; 4

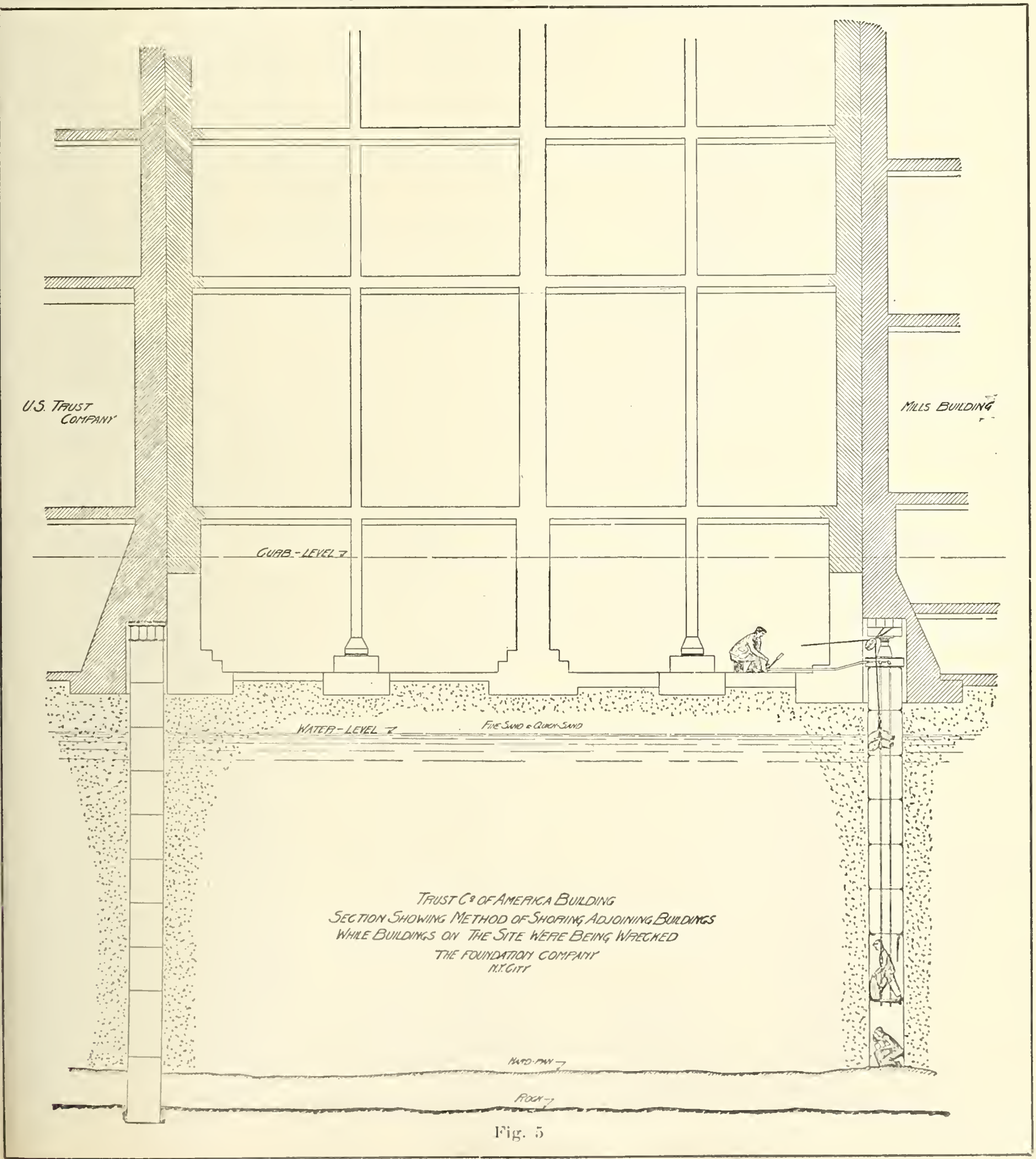
U.S. TRUST COMPANY
MILLS BUILDING
CURB-LEVEL
WATER-LEVEL
FINE SAND & QUICK SAND
TRUST Cº OF AMERICA BUILDING
SECTION SHOWING METHOD OF SHORING ADJOINING BUILDINGS
WHILE BUILDINGS ON THE SITE WERE BEING WRECKED
THE FOUNDATION COMPANY
N.Y. CITY
HARD-PAN
ROCK

Fig. 5

air locks; 1 concrete mixer; air receivers, after-cooler, shafting, pumps, buckets, etc.

In order to economize space no boilers were installed, steam being purchased from the N.Y. Steam Company.

Fig. 12 shows a general view of the lot at the Municipal Building, situated at the N.Y. end of the Brooklyn Bridge, while the sinking of the caissons was in progress. It was one of the largest and most difficult building foundation jobs ever executed. Resting on one hundred and six pneumatic piers, sunk to a depth of 112 ft. below water level, which is in turn 32 ft. below the street, it will rise to a general height of twenty-five storeys. On top of this is to be a tower of fifteen additional storeys. This distance of 112 ft. below water level, constitutes a record for depth in sinking pneumatic caissons for foundations of city buildings.

The plant on the job consisted of the following: 12 boilers, ranging from 60 to 125 h.p. each, and having a total combined value of 1,785 h.p.; 5 Ingersoll-Rand Compressors; 1 McKiernan Compressor;3 feed water heaters; 2 sets twin air receivers; 3 after coolers; 35 double drum hoisting engines; 3 4-boom trav-

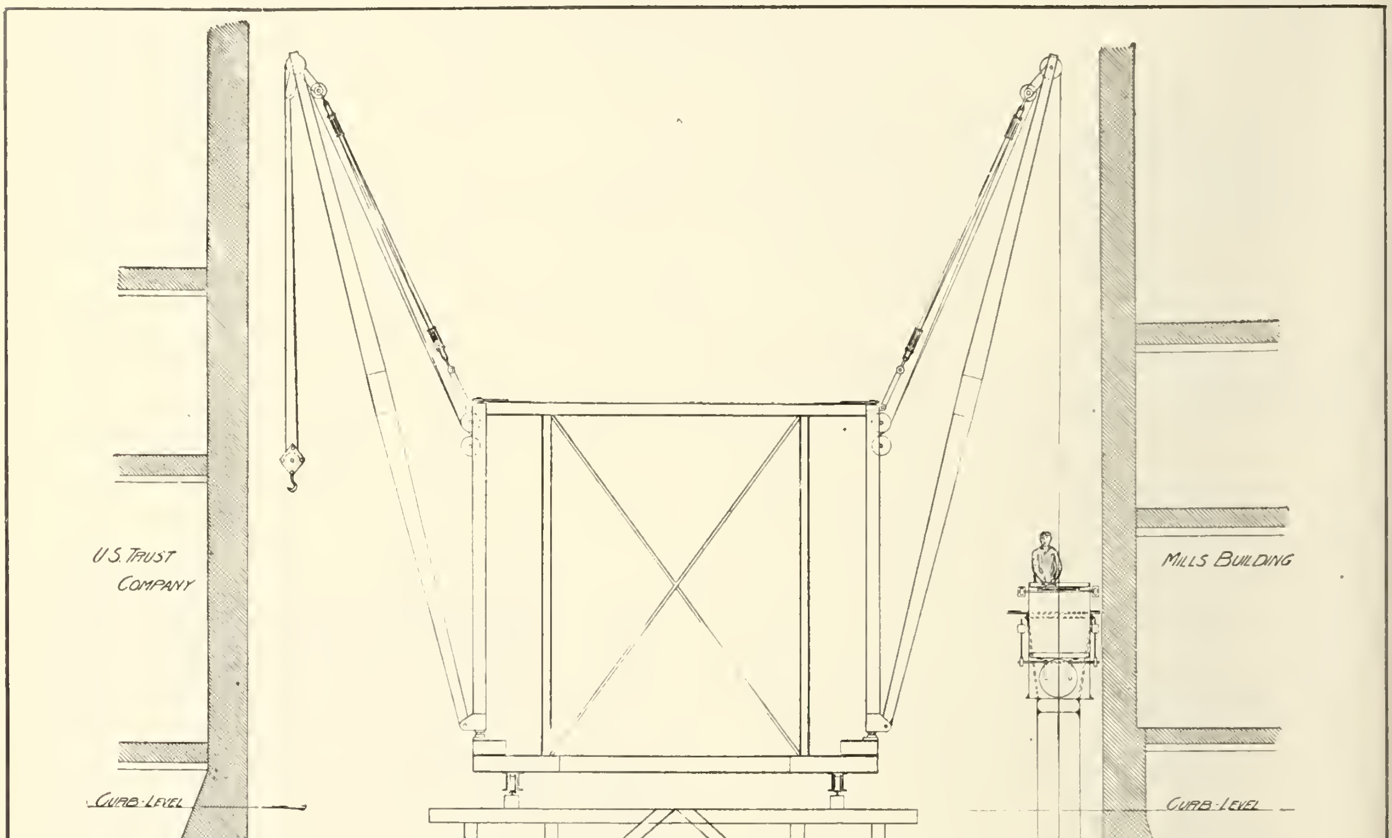

Fig. 6

ellers; 14 stiff leg derricks; 5 concrete mixers, and 16 air locks,—besides numerous pumps, brackets, cars, etc.

The question of confined space naturally leads up to the adjacent property factor. On fully 90 per cent. of The Foundation Company's New York city work, it is found necessary to shore and maintain the adjoining buildings. Each one of these is usually a new problem and has to be handled in a special manner.

Shoring by means of cylinders has been cited, as well as shoring with spur braces on the Dominion Express building. At the Singer Building, the neighboring building, a ten-storey structure, was shored by means of needle beams. (Fig. 13.) As the load was heavy, being 27 tons per lineal foot of wall, these needles were each made up of six 24-in. 100 No. I-beams, built up in two courses. These beams were carried on oak bed blocks, each block supported by 50-ton steel shoring screws.

In the twelve-storey Wolfe Building, the company had to handle a tall structure of very small base. The problem was further aggravated by the fact that the basement of this building was so full of machinery that it was impossible to assist the shoring from the inside. The method followed (Fig. 14), there-

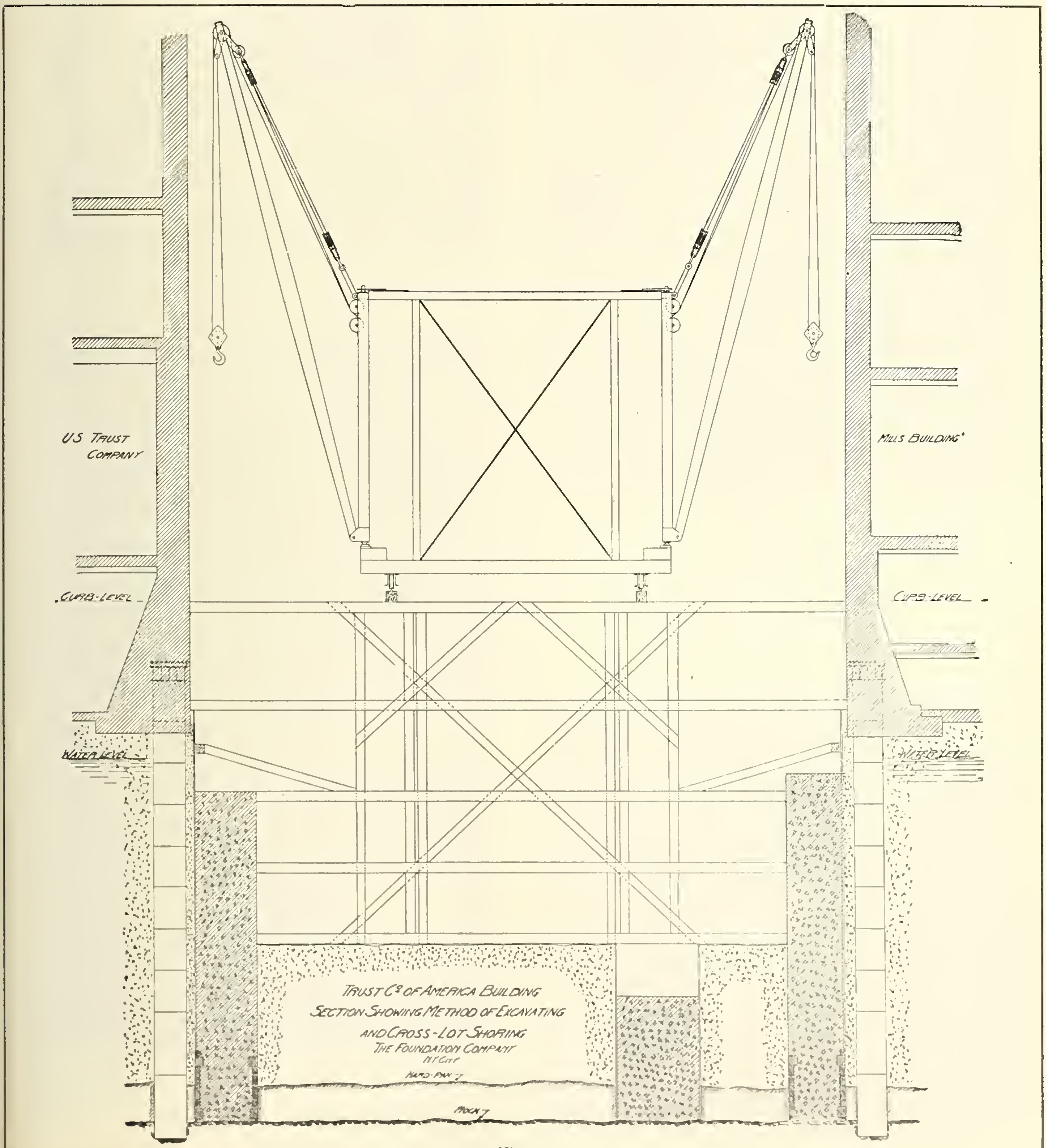

Fig. 8

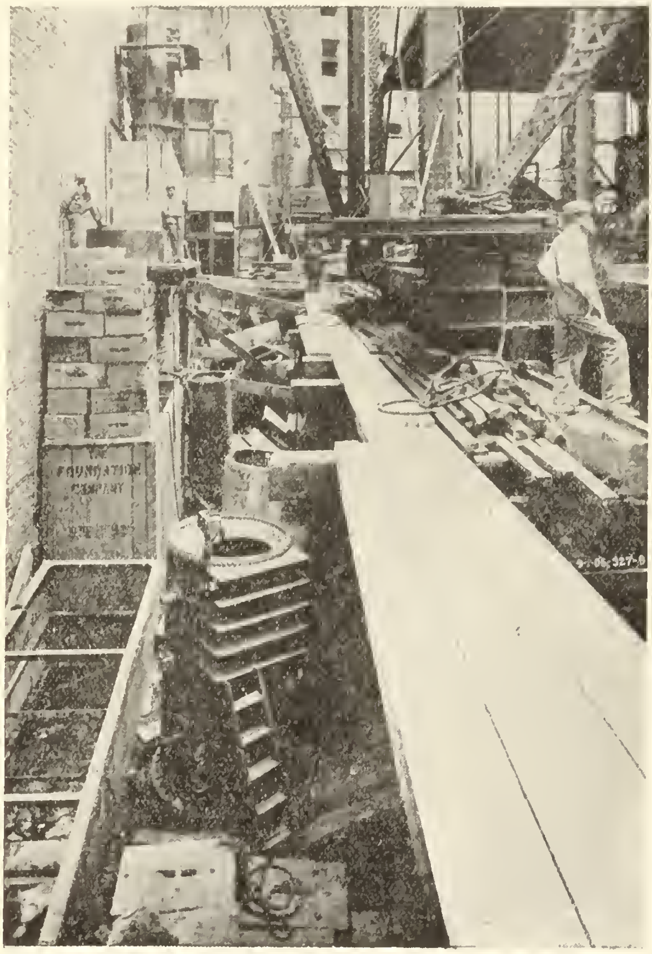

Fig. 7—Caisson work for the Trust Company of America Building

Fig. 11—Foundations installed for the Singer Building, New York City

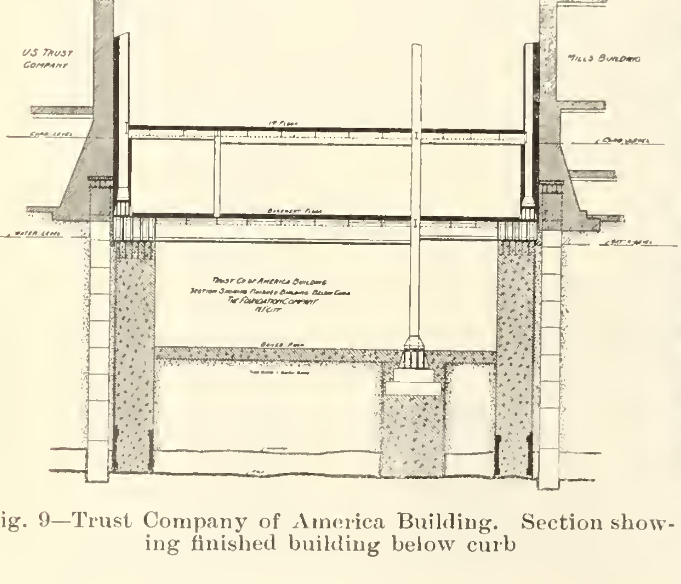

Fig. 9—Trust Company of America Building. Section showing finished building below curb

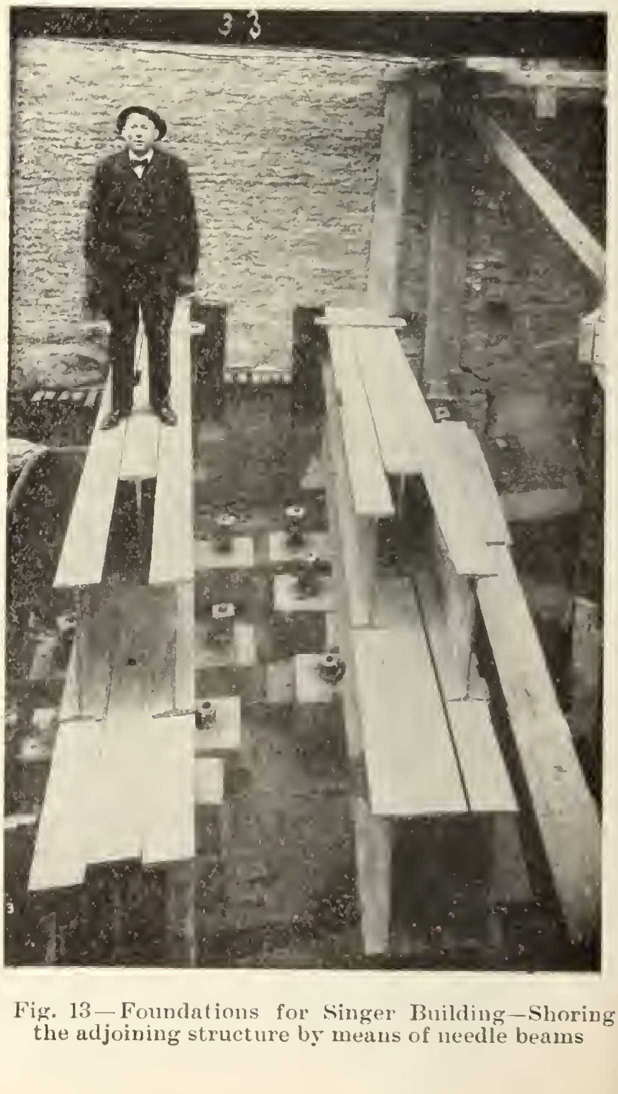

Fig. 13—Foundations for Singer Building—Shoring the adjoining structure by means of needle beams

fore, was to use long inclined frame pushers seated on oak bed blocks and shoring screws. The top of each leg of the pusher was fitted with a drop-forged cap in the form of a hemisphere. These in turn fitted into drop forged sockets on the underside of structural steel brackets bolted to the columns of the building. The long inclined pushers were assisted by short ones placed in almost a vertical plane with their tops fitted into niches cut in the brick work. In this work as on all the others mentioned, daily readings were taken by means of a level and any adjustment found necessary was made by the shoring screws.

The sheeting of the streets is also a matter which requires careful consideration and handling. The streets in the downtown district of New York carry a heavy traffic, and are filled with large water and gas mains, sewers and electric conduits, as well as an occasional subway. This means that the contractor's responsibility is a heavy one.

The sheeting at the U.S. Realty Building, corner of Broadway and Cedar street, consisted of 4 in. L.L. Y.P. extending along the Broadway end of the lot and about two-thirds of a distance down Cedar street. (Fig. 15.) This was driven with a Vulcan steam hammer carried in the leads of a standard pile driver set up on top of the Broadway foot bridge, also suspended from the derrick booms for the Cedar street side. At the Church street end of the lot steel sheeting was used.

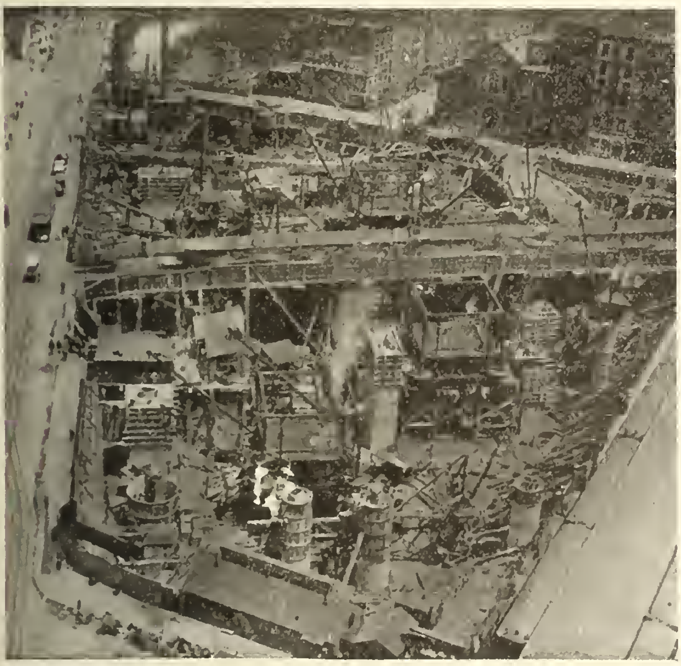

Fig. 12—General view of operations at the site of the Municipal Building, New York City

Cross-lot bracing is often used to maintain the street sheeting as the excavation progresses. This is a rigid construction which holds the sheeting true to line and does not yield as inclined pushers sometimes do, as a result of the necessity of changing the heels in excavating deeper.

A photograph of the U.S. Express Building on Rector street is shown in Fig. 16. The traveller setting on wooden piles, which had been previously driven, was used to excavate the lot and handle the heavy sticks of timber used in the cross-lot bracing. In the background may be seen an elevated railroad, showing one of the contingencies in this city work.

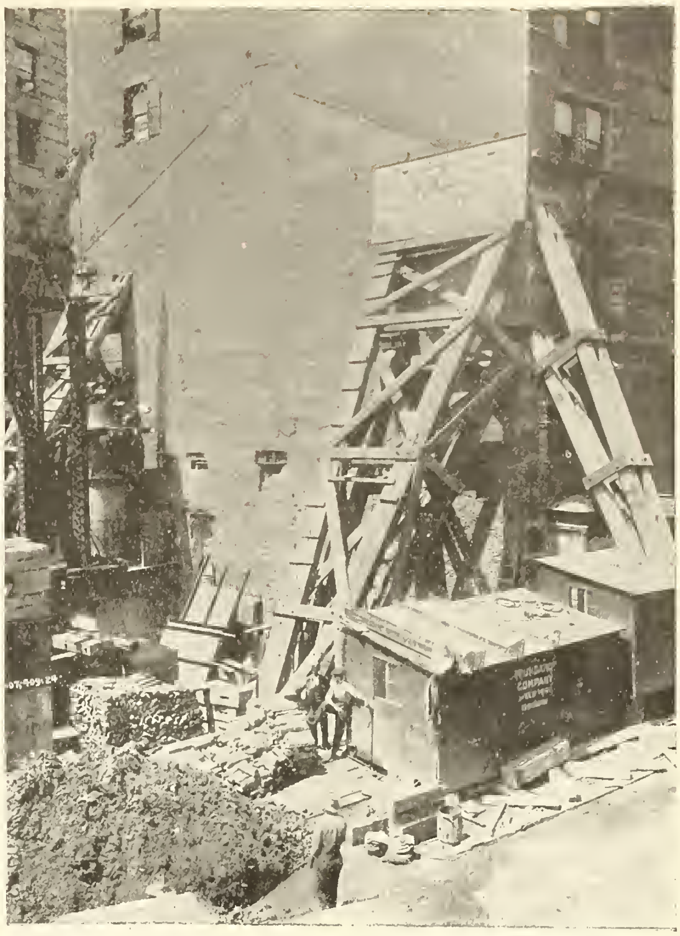

Fig. 14—An unique problem in the Wolfe Building

At the Bankers' Trust Co., corner of Wall and Broad streets, previously mentioned as the building whose general excavation extends down 60 ft. below the curb, the cross-lot bracing may be of interest. (Fig. 17). This is a water-tight cellar—that is, one having caissons sunk end to end around the outside of the lot. On account of the great depth, the caissons unaided were not sufficient to carry the weight of the street, for it should be borne in mind that in

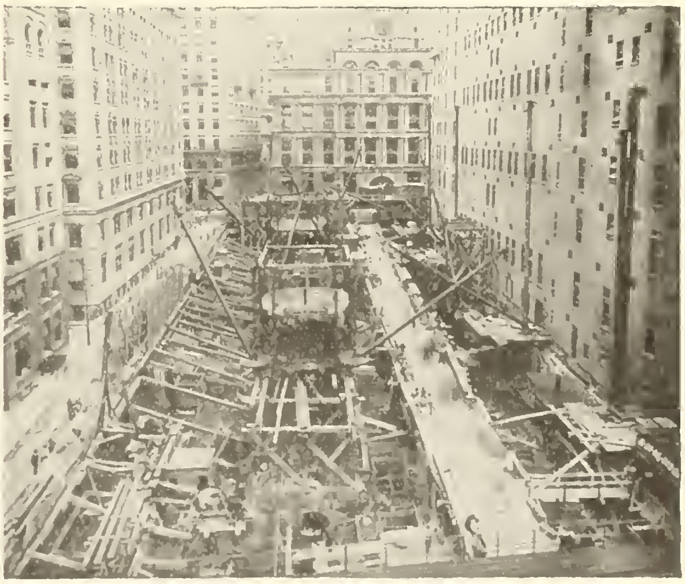

Fig. 15—Methods employed on the U. S. Realty Building, New York City

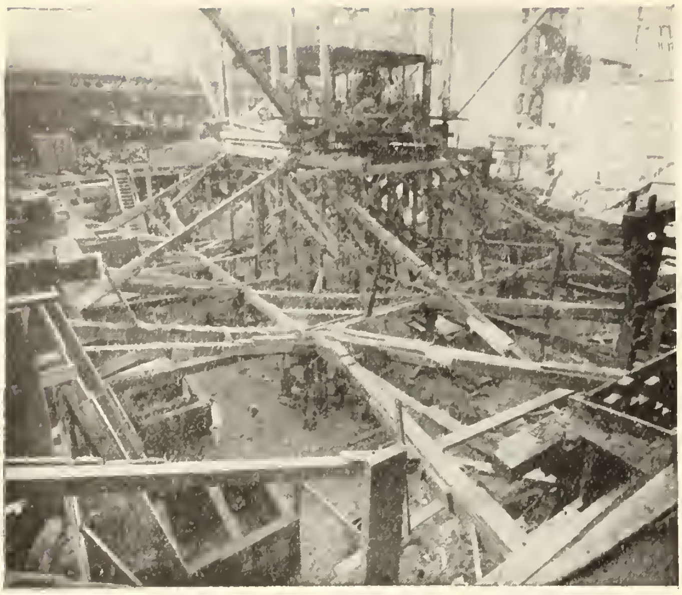

Fig. 16—Foundation work for the U. S. Express Building, New York City.

work of this nature not only the normal earth pressure has to be considered, but also the additional pressure due to the surrounding structures whose footings do not extend down to the level of the new excavation. These buildings are often of some height and great weight. In this instance, the caisson wall was therefore reinforced by heavy cross-lot bracing as the lot was being dug out.

In closing, it might be stated that the pneumatic caisson as a means for sinking the piers for large buildings had been adopted, notwithstanding its somewhat greater expense, for the following reasons:

First—Because it permits of the installation of the foundation of a new building without any injurious effect on the surrounding property.

Secondly—An owner of a buildiny resting on pneumatic caissons need not fear any operation around his building. Also,

Thirdly—Because up to date there has never been a case of failure.

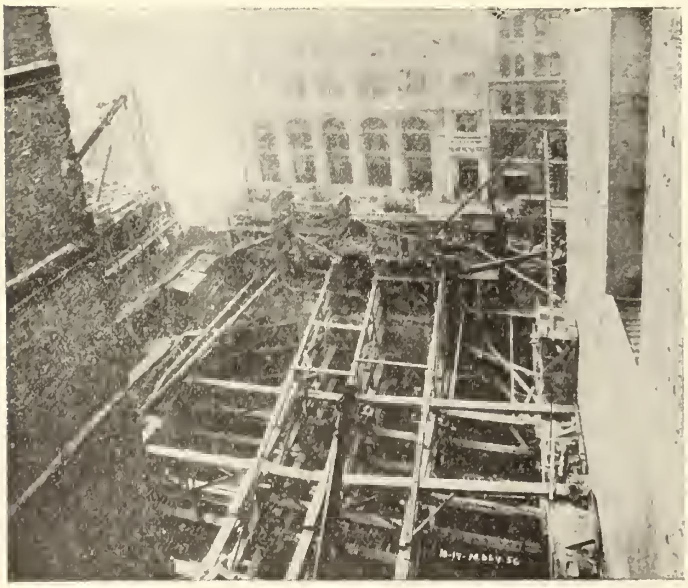

Fig. 17—Site of the Bankers Trust Company's Building, New York City. The general excavation for this structure extends 60 feet below the curb.

A Test of Watertightness of Concrete Tunnel Lining Under High Level Head

C. Raymond Hulsart, Assistant Engineer, Board of Water Supply, City of New York, reports that a recent test in the Wallkill Pressure Tunnel of the Catskill Aqueduct, on the new water-supply for New York City, showed the practicability of making concrete construction watertight against high heads. The test was made upon the concrete lining of the tunnel, which is being constructed of a nominal 1.2.4 concrete without the use of any waterproofing material.

The concrete lining, constructed in circular section, is designed as an arch to withstand the maximum ground-water head when the tunnel is empty and to prevent leakage into the tunnel when empty or outward when in service. The construction of the tunnel is described in detail and illustrated with profile and sectional drawings and photographs of complete work. The author presents the following important conclusions:

It may be safely concluded that with reasonable care in mixing and placing of concrete, and with sufficient excess cement a concrete can be had which will be practically watertight against hydrostatic heads of several hundred feet. In case of tunnel lining proper, care in placing, of course, includes care in arrangement of collecting pans and weepers to carry leaking ground-water through the concrete and forms without damage to the body or fiuish of the concrete. Where small leaks may have been overlooked or a collecting pan fail to work, causing some slight seepage through the concrete, it would appear from the foregoing that even though the area of lining affected be considerable, the actual amount of water passing through would be small, and that such spots of seepage will grow less by silting up.

Concrete paving blocks are to be used to protect the slope of dam No. 3 of the North Platte Project of the United States Reclamation Service. The dam is to be an earth embankment, built in 6 in. layers, with a water-slope of 2½ to 1. The concrete slope paving is 8 in. in thickness and is made in blocks, separately molded, having an exposed surface area of not less than 32 sq. ft. The specifications provide that the blocks shall be laid upon a layer of screened gravel. They are rectangular in plan, with a length of 6 ft. 6 in. and a width of 5 ft. 3 in. It is further provided that in forming the blocks the upper surfaces shall be screeded to a smooth finish and the blocks allowed to season for three months after making, before they may be placed on the slope. The blocks are to be laid without mortar, and each horizontal course breaks joints with the course immediately below it by at least 18 in. The blocks are to be laid in contact and have face joints not exceeding ½ in. in width. After removal from the molds the blocks are to be covered from the sun and sprinkled daily with water for a period of one month while the concrete attains its full strength.

Vitrified clay cubes, 2 in. on a side, laid in Portland cement concrete, form the wearing surface of a highway in Monroe County, New York. These cubes are placed on a broken stone or gravel foundation, and although laid in 1909, it is stated that the roadway has required no repairs up to the present time. Somewhat over a mile of this type of pavement has recently been built in Irondequoit, N.Y., at a reported cost of about $6,000 per mile.

Conditions in the Cut Stone Business

Canadian Contractors must either Invade New Territory or Intrench Their Own—Relations with the U. S. Trade

THE province of Ontario is essentially a stone province, having stone deposits of various qualities in almost every county. It was, therefore, reasonable that the early settlers of this province took advantage of these conditions, and when they desired to build anything more palatial than a log cabin or a frame house, they made stone the predominant building material. These deposits had their limitations, however, so far as dimension stone was concerned, and the increased cost of labor soon made the use of these hard stones prohibitive in any ordinary building where maximum appearance with minimum cost was the first consideration. As the country developed the buildings became more monumental in character, and stone of large dimensions and more elaborate workmanship were daily required, it forced home to Canadian contractors and architects that cut stone worked from local rock would soon become an expensive luxury, reserved for national monuments and government buildings. Consequent limited trade conditions and local materials made it impossible to develop larger fields and complete equipment. It therefore behooved the Canadian cut stone contractor, if he wished to keep cut stone in that place to which it belonged, to look to the foreign market for his supplies.

Trade Relations With U. S. Quarrymen

It was not long before a healthy trade relation developed between the United States quarrymen and the Canadian cut stone contractor. This new trade relation produced a very amiable and advantageous trade condition, benefiting the quarrymen of the United States and the cut stone man of Canada. Some of the offsprings of this very amiable union were the increased efficiency of the Canadian plants, the enlargement of the field and the permanency of supply.

Upon the foundation of this happy condition the Canadian cut stone man is continuing to increase the efficiency of his plant by installing planers and diamond saws. Combined with good system and low cost of production in the shop, it reduced the cost of cut stone, thus increasing the market for his product and helping him to combat the growing menace of stone substitutes.

Having established the stones of the United States as a standard in our markets, we note the birth of a new child of this union, of interest to the Canadian contractor and the American quarryman, a child unlike the rest of the offspring to which I have referred, indeed a very undesirable progeny. I refer to the shipment of the finished product from the mills of the United States into the Canadian market.

As, in the early history of our trade in Canada, the Canadian contractor must meet this new condition with a new expediency if he hopes to keep his trade. Two alternatives present themselves, one an invasion, the other an intrenchment. The former will mean the interesting of Canadian capital at the stone producing centers of the United States, and, if we are to believe in signs, it must not be solely as a cut stone contractor or a quarryman, but a quarryman-contractor.

By intrenchment I mean the securing from our federal government of a proper protection on the finished product. In view of the recent discussions on the pros and cons of reciprocity, and the decisive defeat admisistered to the proposed measure, we would not look for any great opposition in securing this protection. The advantage of the United States contractor, who owns his own quarry and is in the position of abolishing the middleman, is obvious.

The bulk of the machinery in our business is manufactured in the United States. This when brought into Canada costs us twenty-seven per cent. more than the American contractor has to pay for his machines. Operators for these machines command higher wages and therefore our cost of production is greater than the United States contractor operating at the quarries. It is therefore only natural that the Canadian cut stone contractor must take measures to protect his business. This undesirable child of this amiable union is the great issue of the day with the Canadian cut stone contractor, and is the point I have desired to bring out in this paper. It is a matter to which clear and careful study must be given if the Canadian cut stone contractor is to enjoy continued prosperity. The American market is the best market I know of, where we can secure the workable material, and we are indeed fortunate to be in a position where we can avail ourselves of the great facilities and unlimited supply; but in order to hold our trade we must make the invasion or build the intrenchment.

Estimating in Cut Stone Work

By Geo. Oakley, Jr., Toronto

IT seems to me that the first requisite in a successful cut stone plant is the proper understanding of the drawings and grasping of what the draftsman intends to convey. Industrial design has become a universal language. It is the medium between thought and execution; by it alone can the genius of conception convey its meaning to the skill which executes, or suggestive ideas become living, practical realities. Industrial design is emphatically the exponent of the projected works of the architect, and by its aid only is he enabled to express his ideas before the contractors attempt to realize them. So, without this knowledge and the proper understanding to accurately interprete drawings, how can the desired reciprocity of information be attained or how could the architect's drawings fulfil their purpose? The study of drawings is really as indispensably necessary as the ordinary rudiments of learning. It ought to form an essential feature in the education of persons engaging in the stone business, for without that knowledge no work, whether relating to mechanics or buildings, can be advantageously studied.

Beginning then with a thorough knowledge of what is expected of us as contractors, we take our quantities, not carelessly or in a slipshod manner, but with a serious determination to get all the items, and to note anything out of the ordinary that might involve extra work. This process gives us of course not only the amount of stone necessary to do the job, but the labor as well. In determining the cost of labor we are confronted with one of the most abstruse problems to be met with in our business. There was a time when our employees co-operated with us and were proud of our success: were as much interested in our welfare as we were ourselves; in fact were proud to be in our employ, but, since the advent of amalgamated unionism, or the combination of unions into a general body, it seems to be the especial aim of workmen to give as little labor as possible for as much compensation as can be wrung from the employer.

Selection and Training of Foremen

Years ago we could get our draftsmen and our foremen from the ranks of our employees, the advance to such position was almost an established fact and the workmen with such an incentive were conscientious and faithful. But look at the conditions to-day: The man who tries to do a fair day's work is called a bosses' man, is reported to his union as a rusher, and is discouraged in every way from asserting his manhood or rendering what he considers a fair equivalent for his daily wage. We must look for our office men not from the ranks of our employees but must take them from schools, and educate them for the positions, with an especial eye at all times to keep them free from the influences of unionism as practised to-day.

Andrew Carnegie told the secret of his success in these words: "I have been bright enough to get around me men cleverer than myself." So look carefully to your organization; instruct them in the way you wish them to go. A man's greatest wealth is his ability to so organize his ideas that other men may serve the plan which these ideas create.

What to add to the cost of rough blocks to make a stone yard pay can hardly be answered in better way than as our national secretary has answered it in his own famous blotter sent out to the membership during the year; but you must add to his instructions your own personal supervision. Success is not a birthright; it comes out of action, out of effort, out of dauntless persistence. Once you have made a contract, carry it out at all hazards. Better refuse a contract than fail to fulfil its terms. Take a risk when you know you have your quantities right, never mind the other fellow's bid; have confidence in yourself. Be honest in all your dealings, because honesty is one of the real secrets of business success.

To sum up finally, you must have a thorough understanding of the drawings, you must take your items carefully and accurately, you must have good, competent men in your yard; because it makes no difference what price you get for your work, you can never make any money if the work is not properly handled in the manufacture; and lastly you must pay strict attention to your business, endeavoring to know all that goes on in your plant, by close observations and the asking of questions. You must also keep thoroughly posted as to what the architects are doing, being always willing to estimate anything that comes along. The percentage to add to your bid is governed entirely by the condition of business, and the amount of work you have on hand yourself: but above all things do not cut your price to meet the other man's and console yourself with the thought that if he can do it for that price so can you. That is a mistake; find out in advance how low you can go and stick to it. Be fair in all your dealings, both with your architects and your fellow contractor. Practise no imposition and allow no imposition. Then maybe if you can live long enough you may be able to make a stone yard pay.

Properties of Hand-Mixed and Cement-Gun Mortars

Comparative tests of the properties of hand-mixed and hand-applied mortars and those mixed and applied by the cement gun were recently made by Westinghouse, Church, Kerr & Co., of New York, at their laboratory at Whitestone Landing, under the direction of Mr. C. M. Chapman.

The cement used was the Dykerhoff brand imported from Germany, and was delivered in a consignment of twenty-five barrels. Individual samples were taken from these barrels and when mixed and analyzed showed the following composition: SiO_2, 20.28; R_2O_3, 10.24; CaO, 62.31; MgO, 2.17; SO_3, 1.30; volatile, 2.60; total, 99.50.

A test for fineness showed 17 per cent. retained on a 200-mesh sieve, and 4 per cent. on a 100-mesh sieve, while an investigation of the neat tensile strength gave average values of 276, 620 and 652 lb. per square inch at ages of 1, 7 and 28 days respectively. There were four different grades of sand used in conducting these tests, comprising two qualities of Cow-Bay sand, standard Ottawa sand and fine beach sand, the last secured in the immediate vicinity. The difference in the quality of the two grades of Cow-Bay sand was one of fineness only, the distinction being such as would pass a 1/8-inch sieve for one size, the other passing a 1/16-inch sieve. The hydrated lime used was the Limoid brand manufactured by the Charles Warner Company.

Test No.	Mix of mortar	Quality of sand	Tensile strength lb. per sq. in Hand made 7 days	Tensile strength lb. per sq. in Hand made 28 days	Tensile strength lb. per sq. in Machine made 7 days	Tensile strength lb. per sq. in Machine made 28 days	Compressive strength Hand 28 days	Compressive strength Machine 28 days
1	1:3	Cow Bay. Under ⅛ in	187	254	359	441	2084	3530
2	1:3	+15 lb. lime	231	255	377	390	1469	4031
3	1:3	+25 lb. lime	230	232	323	351	1990	3000
4	1.4	No lime	140	196	268	353	1296	3122
5	1:4	+15 lb. lime	157	180	293	337	1343	2487
6	1:4	+25 lb. lime	131	175	345	355	1528	3205
7	1:3	Cow Bay Under 1/16 in	214	293	325	377	1695	4780
8	1:4	"	169	228	193	266	1008	2573
9	1:3	Standard	214	290	463	661	2406	2936
10	1:4	Ottawa	164	222	346	601	1770	3459
11	1:5	"	108	148	530	540	1740	2949
12	1:3	Fine beach	70	94	206	234	1123	2547
13	1:4	"	67	93	183	232	663	2171
15	1:4	+25 lb. lime	108	124	200	215	1064	2571
14	1:5	No lime	71	89	113	179	756	1270
16	1:7	No lime	22	40	83	101	362	709
17	1:9	No lime	17	26	73	92	99	811

There were seventeen different mixtures of the mortar tested, the proportions of which, with the quality of sand and the presence or not of hydrated lime, are shown in the accompanying table. The lime was added to make the mixtures more plastic, and hence more easily handled under the trowel. In all cases the hand work was done by an expert mason, who used the utmost care to secure as nearly perfect workmanship as possible, while the cement-gun mortars were applied in the usual fashion.

In preparing for the test of tensile strength the mortar was applied to a wooden panel placed on a sort of easel. After being applied and finished with a straightedge, the panel was laid in a horizontal position, where the mortar acquired the initial set. Standard briquettes conforming in every way with those commonly used for testing purposes were then cut out of the panel by means of a metal die. These briquettes were placed in a damp closet for twenty-four hours and the remainder of the time, up to the time they were tested, were kept in water. They were tested in the ordinary Fairbanks shot machine, and careful measurements were made of the cross-sections of all of the briquettes tested. Tests were made at the expiration of seven and twenty-eight days and the average results of these tests, together with those of the compressive tests, are shown in the accompanying table. The compressive tests were made on two-inch cubes cut out of panels prepared exactly as for the tensile tests. The methods differed in that the panels of hand-mixed mortars were made up of layers, while those of the cement gun were placed at a single operation. Before testing the compression cubes were faced up on opposite sides to a smooth surface with plaster of Paris, and were then crushed in a testing machine in the engineering laboratory of Columbia University.

The results of the tests which appear in the table show a marked superiority in both tensile and compressive tests of the machine over the hand product. The amount of this factor of increased strength varies from 1.4 to 4.9 for the values in tension and from 1.2 to 8.2 for those in compression.

The tests for surface permeability were made on plates about 1 ft. square and 1 inch thick cut out of slabs prepared as in the previous cases, with the addition of a slight mesh reinforcement, to premit of safe handling. At the age of twenty-eight days the specimens to be tested were subjected to a low-water pressure on the finished or front side in order to determine the rate of absorption of water through their outer surface. On the surface of the plates to be tested a circle 6⅜ in. in diameter was marked, and to the remaining area was applied a waterproof coating of ozokerite, thus exposing a small circular section only to the action of the water. An iron cap with a soft rubber gasket was then clamped to the specimen to prevent leakage, and in the top of this cap was inserted a cylindrical glass tube about ¾ in. in diameter. This tube was graduated into cubic centimeters, the zero of the graduations being at the top of the tube, and when the tests were to be conducted the iron cap and the tube were filled with distilled water. Measurements of the fall of water in the tube were taken at short intervals and at each measurement the tube was refilled in order to preserve as constant a head as possible, the water being taken from a vessel of which the contents had been previously determined. The results obtained were expressed in cubic centimeters of water absorbed over the exposed area, and they indicated a much lower permeability of machine mixed mortar over the hand product. This ranged from 5 to 17 per cent. for the first six mortars, with a somewhat greater range for the remaining mortars, the maximum being 70 per cent.

The absorption tests were made on 2-in. cubes one month old. These cubes were dried out at a temperature of the room in which the tests were conducted, then weighed, immersed for 24 hours and again weighed, the increase of weight being taken as the relative absorption of the specimen. One month later the same cubes were tested for the percentage of voids. At that time they were carefully weighed, immersed in water for 48 hours, boiled for 4 hours to expel any entrapped air and subsequently weighed in air while wet and also weighed in water. From these weights the percentage of volume of voids was determined. The results of these tests show the average absorption of the machine mortars as about 43 per cent. of the hand mixed, with a high value of 71 and a low value of 19 per cent. Similarly the percentage of voids shows an average value of about 60 per cent. with high and low values of 87 and 22 per cent. respectively.

The tests for adhesion were conducted on various grades of brick, building stone and structural materials. The brick ranged in consistency from a soft porous underburned quality to a hard-burned pressed brick, and the building stone combined sand stone, blue stone and granite. In the case of the latter, sections were used about the size of building bricks, while of the structural material 4 in. sections of a 6-in. I-beam were employed. One end of the stone blocks was tooled in parallel lines, while the other had the natural fracture of the stone. Besides applying the mortar the block to be tested was first soaked and the end was then inserted in the back of a wooden panel and brought flush with the surface of the wood. The mortar was then applied either by hand or machine to a depth of about ¾ in. over this surface. After allowing a short time for hardening the adjacent mortar was cut away from that of the test section and the latter was placed in a mold about twice its length, but of the same width and thickness. The top surface of the applied mortar was then roughened somewhat to provide a bond and the mold was filled with concrete reinforced with four reinforcing wires. These composite specimens were then stored in damp sand until they were tested. In conducting the tests these specimens were laid across round iron rods spaced 14 in. apart for the brick and stone and 12 in. apart for the structural steel. A round iron rod was then laid along the plane of contact and a loading basket was suspended from this rod. The load per square inch required to break off the mortar thus applied is taken as a measure of the adhesion between the two materials. The value of this is readily determined from the conditions of the tests. The average results of these tests are given below.

RESULTS OF ADHESION TESTS.

Mix No. Gun	Mix No. Hand	Kind of Material	No. tests Gun	No. tests Hand	Fibre stress lbs. per sq. in. Gun	Fibre stress lbs. per sq. in. Hand	Ratio Gun to Hand
4	1	Soft brick	3	6	455	406	1.12
4	1	Medium brick	2	8	358	483	.74
4	1	Hard burned brk.	3	3	386	296	1.30
4	1	Finished brick	4	4	411	406	1.01
4	1	Blue stone block	3	1	574	345	1.67
4	1	Sand stone block	2	2	573	525	1.09
4	1	Granite block	2	1	460	530	.87
4	1	Clean iron I-beam	5	3	458	362	1.27
4	1	Rusted iron I-b'm	9	6	440	448	.98
Average of all tests on similar materials			30	24	465	365	1.11

The tests show that in a number of cases of hand-prepared specimens the adhesion was so slight that they broke in handling before reaching the age of 28 days and were therefore not tested. It is stated that in no case was there such a failure of specimens prepared with the cement gun. Special care was required to produce a good hand-made specimen. This fact is an indication of the liability of hand-applied mortar to show incomplete adherence to the surfaces to which it is applied.

The duty collected on cement, including the duty on paper bags containing the same, imported into Canada from the United States during the year ended 31st March, 1911, according to the Trade and Navigation Tables, is 32 per cent. of the value of the cement, or 43¾ cents per barrel of 350 pounds.

Calgary—The City of Progress

Great Project for Development of Natural Gas—More Building Records—Local Exchange Flourishing

Calgary, March 14, 1912.

Calgary, the "cow-town" of yesterday, to-day looks forward with assurance to the time when it will be the commercial metropolis of the Last Great West. Of the recent developments which justify this outlook none is of such moment as the location of the new C. P. R. shops at Calgary, the construction of which has just commenced, and the contract for which is the largest let to any single concern for many years.

Calgarians look for a big Christmas present this year for the reason that December 1st is the date on which the contract calls for the completion of the shops, and when it is remembered that the men and those dependent on them, will mean at least an addition of 20,000 people to this city, some definite idea can be formed of the certain growth of Calgary during the present year.

Other important developments will undoubtedly take place, of which not the least important is the introduction and supply of natural gas to this district. Mr. Eugene Coste, president of the Canadian Western Natural Gas, Heat, Light and Power Company, has announced that a supply will be turned into the Calgary mains by August. The company's debentures, to the extent of $4,000,000, have recently been successfully negotiated in London, Eng. The treasury of the company is therefore in a most excellent condition. Mr. Coste has given figures indicating the colossal nature of this undertaking. The wells are situated at Bow Island, some one hundred miles distant from Calgary. The daily supply from seven wells already driven to an average depth of 1,900 feet, will be 72,000,000 cubic feet of gas. It is proposed to drive 18 more wells immediately and when these are completed the daily supply will be three times the output now in sight. The present output is equivalent to 720,000 horse power, or 5,285 tons of coal per day. The gas is said to have just twice the heat energy of the Pittsburg product, It is stated that this is the largest scheme of the kind ever undertaken at one time.

C. P. R. Hotel Construction

Perhaps the most important building now under construction in Calgary is the new C. P. R. Hotel, occupying a fine site adjacent to the company's depot, and in the very heart of the city. Plans and specifications have been received by Mr. H. A. Singley, western manager for Peter Lyall & Sons Construction Company. Work on the building proper will be commenced about April 1st. The foundations are being finished rapidly and will be completed in time to receive the steel work expected towards the end of the month. The building will be in the shape of a letter E. It will be eight storeys, or 138 feet high, and will have three hundred rooms. The dimensions are 227 feet long by 135 feet wide. The total cost is roughly estimated at $1,500,000, and it is expected that some five hundred men will be employed on it during construction. The material used will be stone to the second storey, and a light grey or buff brick with stone dressings for the remainder of the elevations. The building will be of steel framework construction throughout, and of sufficient strength to permit the addition of four storeys.

More Building Records

The volume of building permits issued during the first two months of this year is the largest ever recorded in the history of Calgary, and reaches $1,322,508. This is approximately 105 per cent. increase over the value of the permits issued during the first two months of 1911, which totalled $629,700. The number of permits issued this year was 227, as against 147 for the same period of 1911. The value of permits issued during February shows 182 per cent. increase over February, 1911. Last month's total was $938,724.

An important announcement was made on February 28th by Mr. Dean, of Winnipeg, to the effect that Mr. Martin Beck, head of the Orpheum Circuit, has decided to erect a playhouse in Calgary. A site has already been purchased in the city and plans are now being prepared for the immediate erection of a theatre to cost approximately $250,000.

The city engineer has prepared estimates of the various bridges required and the total amount of money necessary to construct these bridges, if such are decided on by the council, will be $829,200. Reinforced concrete is the material proposed for the greater portion of the work.

A communication from the Canadian Association of Underwriters of Winnipeg, concerning the reduction of insurance rates in Calgary, which has recently been taken up with the association by Mayor Mitchell, requests the Mayor to forward a full report of Calgary's fire fighting apparatus. The total fire losses for the city of Calgary during the year 1911 amounted to less than $25,000, and with the recent addition of a complete motor driven equipment, it is anticipated that the loss this year will be reduced to a minimum.

The purchase of the Calgary Milling Company by the Robin Hood Company is now completed. The deal involves nearly half a million dollars. It is stated that the Robin Hood Company intend to increase the size of the Calgary Mills to double the present capacity. This means that the new firm will turn out 1,500 to 2,000 barrels daily. The purchase includes the mills at Calgary and the elevators in the various parts of the province connected with the mills.

Builders' Exchange Has New Quarters

The Calgary Builders' Exchange has now removed into new quarters in the Judge Travis Block on Seventh street east. This is a thoroughly modern block and is served by two elevators. The Exchange has a large hall on the floor of which several members have taken desk space. This arrangement is proving very successful both for the convenience of contractors and supply men alike. An estimating room and an office for the secretary adjoin the main hall. The membership is steadily increasing and a Sheet Metal Contractors' Section has been formed. The future of the Exchange is now assured, and with the coming of the National Convention to Calgary in 1913 our organization will occupy a prominent position in the building growth of the Golden West. And so Calgary will remain in the van of progress. —Arthur Chamberlin.

Judge Laurendeau, at Montreal, has decided that the mains and service equipment of a water company do not constitute real estate, and he accordingly dismissed the action of the School Municipality of St. Cunegonde against the Montreal Water and Power Company. The municipality sought to recover taxes on the ground that the water system within the limits of the municipality constitute taxable holdings, but the judge held that the mains did not come within the scope of the school law, nor could they be described as improvements or "constructions."

Western railway companies are now faced with the problem of securing between fifty and sixty thousand men to carry out the vast development mapped out by the companies in the Canadian West during the summer of 1912. The work to be undertaken this year is greater than ever before, and it is doubtful whether the supply will meet the demand. The G.T.P. and the C.N.R. are willing to take on all they can possibly get, as both companies are desirous of rushing through their main line to completion.

Important Recommendations Laid Before Dominion Government

A large deputation representing the Boards of Trade of Ontario waited upon the Premier at Ottawa last week and made a strong plea for Federal subsidies to the provinces for the construction of good roads; the speedy construction of extensions to Welland Canal; the improvement of waterways and harbors in Ontario; the construction of the French River section of the Georgian Bay Canal; the conservation and improvement of the St. Lawrence water route and the levels of the Great Lakes; the construction of a St. Lawrence Canal system of thirty feet depth, and the appointment of a commission to report upon the development of water powers along the boundary by the Government.

In the course of the hearing there was placed before the Government for the first time a proposition, combining to some extent, both the Welland and Georgian Bay Canal projects. The suggestion was made that the French River section of the Georgian Bay system would be constructed as a feeder to the Welland route. It was pointed out that the section from Lake Nipissing to Georgian Bay could be constructed easily and at little cost, that it would give the Temiskaming and Northern Ontario a lake port, that the Canadian Pacific and Canadian Northern lines would have a lake port at North Bay, that three more railway lines would be added to the list of grain carriers, and that the water powers of the French River would be made available for development.

No less than sixty-eight Boards of Trade were represented by the deputation.

Welland Canal Project

Mr. A. W. Wright, of Toronto, introduced the subject of the Welland Canal. The improvement of the canal he urged as a necessity if Canadian water-borne traffic were to be preserved. The new Erie Canal would be the finest barge canal in the world, and would reduce the cost of transportation by one-third to one-half. The Government should deepen all the waterways from the Great Lakes to the ocean. The water powers developed might be sufficient to finance the whole scheme. Mr. Wright contended that the Georgian Bay Canal would not be in a position to compete successfully with the Erie.

Premier Borden, in reply, stated that the problem of transportation was especially important in Canada, with its wide area and relatively sparse population. As to good roads, the Government had already given an earnest of its interest in the bill now before Parliament. Good highways were a necessary adjunct to the scheme of rail and water transportation. The question of developing the waterways would receive earnest and careful consideration, and the best advice obtainable would be had. The suggestions of the deputation, if carried out in their entirety, would involve a very large expenditure, but the Government must take a large and comprehensive view of the situation, and they hoped to deal with it in that way.

Winnipeg's building permits for the first two months of the year totalled $1,289,260. The number of permits issued was 344, compared with 218 for the corresponding period last year, representing in value $816,750. Building Inspector Rodgers and other competent critics confidently expect that permits to the value of $20,000,000 will be taken out during 1912. Last year's total was in excess of $17,000,000. When the new Public Health Act goes into force it is expected that there will be much activity in the construction of apartment houses, the conditions governing which at present are most drastic. The proposed Act has passed its second reading and will probably become law within the course of a week or so. It is stated that as soon as the Act is passed permits will be taken out for a score of new apartment buildings valued at anywhere from $100,000 to $500,000. An early start has been made this year in residential building all over the city. Rumors of many large commercial buildings are coming from the offices of the leading architects, and altogether 1912 looks like a year of exceptional activity.

Supply of Cement to Department of Railways and Canals

In the House last week the question was asked whether any tenders had been received up to January 30, 1912, for supplying approximately 210,000 barrels of cement to the Department of Railways and Canals. The information given disclosed the fact that tenders had been submitted by the Canada Cement Company, Montreal; Alfred Rogers, Limited, Toronto; W. McNally & Company, Montreal; Stinson-Reeb Builders' Supply Company, Westmount, Que. These tenders were still under consideration.

In reply to a request for particulars of last year's tenders the following details were given:

Alfred Rogers, Limited, Toronto, and the Canada Cement Company, Limited, Montreal, tendered as under:

Alfred Rogers, Limited:—Trent Canal—Trenton Junction, 16,000 brls. at $1.95, less 10 cents for bags; Campbellford. 25,000 brls. at $1.95, less 10 cents for bags; Hastings, 23,000 brls. at $1.95, less 10 cents for bags; Newmarket or Holland Landing, 15,000 brls. at $2, less 10 cents for bags.

Canada Cement Company:—Trent Canal—Glen Miller or Frankford, 20,000 brls. at $1.95, less 10 cents for bags; Campbellford, 25,000 brls. at $1.95, less 10 cents for bags; Hastings, 23,000 brls. at $1.95, less 10 cents for bags; Lakefield, 7,000 brls. at $1.95, less 10 cents for bags.

Canada Cement Company:—Quebec Canals—St. Gabriel shed, Montreal for Lachine canal, 23,000 brls. at $1.85, less 10 cents for bags; St. Gabriel shed, for Soulanges canal, 17,250 brls. at $1.85, less 10 cents for bags; Chambly Canton for Chambly canal, 600 brls. at $2.05, less 10 cents for bags; St. John for Chambly canal, 600 brls. at $1.90, less 10 cents for bags; St. Ours lock, 450 brls. at $2.10, less 10 cents for bags.

Canada Cement Company:—Rideau Canal—At Ottawa, 1,500 brls. at $1.95 barrels net.

Canada Cement Company:—St. Lawrence Canals—Cornwall, 6,650 brls. at $2, less 10 cents for bags; Morrisburg, 200 brls. at $2, less 10 cents for bags; Farran's Point, 250 brls. at $2, less 10 cents for bags.

Canada Cement Company:—Welland Canal—Welland, 300 brls. at $1.90, less 10 cents for bags; Port Dalhousie, 500 brls. at $1.90, less 10 cents for bags; Dunville, 350 brls. at $1.90, less 10 cents for bags; Merritton, 350 brls. at $1.90, less 10 cents for bags; Port Colborne, 1,500 brls. at $1.90, less 10 cents for bags.

Canada Cement Company:—Sault Ste. Marie Canals—Sault Ste. Marie, 200 brls. at $1.95, less 10 cents for bags. Four bags to the barrel, making 350 lbs. net.

Illustrating the difference in prices in three years the following are particulars of contracts made by the Department in 1909:

Vulcan Portland Cement Company:—Quebec Canals—f.o.b. cars, St. Gabriel shed, No. 2; Montreal, $1.46, less 10 cents bags returned, 4 bags to barrel. Cornwall Canal—f.o.b. cars, Ottawa and New York siding, north side of canal, $1.57, less 10 cents bags returned, 4 bags to barrel. Intercolonial Railway—Delivered at Halifax, 200 barrels at 43 cents per 100 lbs. in bags.

Stinson-Reeb Builders' Supply Company:—Intercolonial Railway—Delivered at Riviere du Loup, 200 barrels at 41½ cents per 100 lbs. Delivered at Moncton, 200 barrels at 43½ cents per 100 lbs.

Personal Mention

Mr. C. J. Pim, town clerk, Sault Ste. Marie, Ont., is taking applications for the post of Town Engineer. The closing date is March 21.

Mr. J. W. Richards has been elected President of the Calgary Builders' Exchange in succession to Mr. J. W. Aldridge, who is removing to Winnipeg.

On Friday, March 8th, Mr. F. P. Jones, general manager of the Canada Cement Company, Limited, left Montreal for Bermuda, having received news of the serious illness of his father.

Mr. A. D. Woodman, treasurer and managing director of the Canadian Domestic Engineering Company, Limited, Montreal, is on a visit to the West Indies and South America.

Mr. J. T. Child, city engineer of Calgary, is preparing plans for a high level concrete bridge, to connect the main part of the city with North Hill. The estimated cost will be in the neighborhood of one million dollars.

The annual dinner of the Engineers' Club at Toronto will be held at headquarters, 90-96 King street west, on March 31st at 6.30 p.m. Tickets may be obtained from the Secretary, Mr. R. B. Wolsey. Mr. C. H. Heys is Chairman of the House Committee.

On March 8th, Mr. Francis P. Smith, M. Am. Soc. C.E., Chemical and Consulting Paving Engineer, New York City, delivered an illustrated lecture on "Mixing Plants for Bituminous Pavements," before the Graduate Students in Highway Engineering at Columbia University.

The will of the late Mr. Allan Ronald MacDonald, contractor, of Montreal, who died in England, July 15 last, was filed in Toronto recently. Mr. MacDonald was the contractor for the Temiskaming and Northern Ontario Railway. The entire estate is valued at $1,095,790.

Mr. George W. Tillson, M. Am. Soc. C. E., Consulting Engineer to the President of the Borough of Brooklyn, New York City, on March 11th delivered an illustrated lecture on "The Comparison of Pavements," before the Graduate Students in Highway Engineering at Columbia University.

Among those recently admitted to membership in the American Society of Civil Engineers were Mr. Geo. W. Volckman, Chief Engineer of the Montreal, Ottawa and Georgian Bay Canal Company, Ottawa, and Mr. Geo. E. Vansittart, of the engineering staff of Messrs. Smith, Kerry & Chace, Toronto.

Mr. Louis Coste, the engineer sent to Victoria, B. C., last December, to examine and report upon the nature of harbor improvements required there, has submitted his recommendation. These include the immediate construction of a breakwater and pier, and provision for gradual increase in docking facilities. The estimated cost of the proposed breakwater is $1,250,000. The balance of the present work will cost another half a million.

The death occurred at Montreal on Thursday, March 7th, of Mr. John Dillon, who was for many years engaged in business as general contractor and dealer in crushed stone, in association with the late Mr. John Keegan, under the style of Keegan & Dillon. Mr. Dillon, who had been in ill-health, took a trip to Bermuda in order to recuperate, but without avail. He had only returned to Montreal a few days when he died. A wife, two daughters, and four sons survive.

Mr. A. E. Speakman, City Engineer of Brandon, Man., returned home last week after an extended trip to eastern Canada. The first-named city came in for the greater part of his attention, and Mr. Speakman spoke enthusiastically about the water and lighting systems in the Queen City upon his return. Concrete poles similar to those used in the Toronto lighting system have been recommended for Brandon. Mr. Speakman will prepare a special report for his council.

Civic officials and departmental employees of the city of Westmount met on Saturday night, March 9th, for their first annual banquet, which was made the occasion for expressions of good will and harmony between the council and its staff. Mayor Rutherford presided, and with him were Mr. A. D. Shibley, city clerk; Mr. Alex. Currie, city surveyor, and Mr. F. S. MacLennan, city attorney, together with a company of fifty. The toast of the Mayor and Aldermen was proposed by Mr. Currie.

Mr. F. H. Barwick, president and managing director of Messrs. Geo. W. Reed & Company, Limited, roofers and sheet metal workers, Montreal, presided at the fifth annual banquet of the members of the office staff and superintendents and foremen. The occasion also commemorated the sixtieth anniversary of the founding of the firm. The func-

Mr. C. A. Dufort, Montreal

A New Architectural Firm at Montreal

Messrs. C. A. Dufort and L. J. T. Decary are the members of a new architectural firm lately registered in Montreal. Both of these gentlemen are graduates of the Boston Institute of Technology, the former of the class of 1903 and the latter of that of 1905. Each has extended experience in the practice of architecture. Mr. Dufort has been the author of many notable designs during the last seventeen years, while Mr. Decary obtained valuable experience with Messrs. Ross & MacFarlane, Montreal. At the present time the new firm have a considerable amount of work in hand. Of their more important commissions may be mentioned the new clothing factory of Messrs. H. Vineberg & Company, described in our last issue

Mr. L. J. T. Decary, Montreal

tion was a very pleasant one and was marked by speeches by the Chairman, Mr. S. M. Baylis, and other gentlemen, the keynote being the expansion of the business and the prospects of future business. In honor of the completion of thirty years' service with the company, Mr. Barwick was presented with an onyx clock, the presentation being made by Mr. R. J. Norman. At the annual meeting of the company held recently, the statements of the business done in 1911 showed the volume of business to be twenty per cent. in advance of the best previous year. The old board of directors was re-elected, consisting of Mr. F. H. Barwick, president and managing director; Mr. S. M. Baylis, vice-president; Mr. Jas. K. McNutt, secretary-treasurer, and Messrs. R. W. McIntosh and D. Taylor.

Construction News and Notes

The Controllers of Montreal have under consideration a scheme for extending and improving the city markets at an estimated cost of $500,000.

The Port Credit Brick Works, Toronto, had to close down temporarily last week owing to delay in the delivery of forty or fifty carloads of coal.

Competitive plans are called by the School Board of Point Grey, B.C., for three new 8-room schools. A by-law to provide $125,000 will be submitted to the ratepayers.

The Province of Quebec Association of Architects will hold a special general meeting in Montreal on the 26th inst. to discuss the city building by-laws and the proposed model contract.

The railway policy of the Province of British Columbia, as outlined by Premier McBride, involves a guarantee of bonds for $26,000,000, cash subsidies of $800,000, and nearly $2,000,000 in other payments.

At Edmonton, Alta., operations will shortly be resumed by Pressed Brick Limited, whose plant has been inactive for two years. It is stated that the firm will spend $100,000 in the purchase of new machinery.

The C. P. R. has notified Premier Gouin that they will begin the construction of a line through Temistamingue next summer. If the C. P. R. fails to do this, the Quebec Provincial Government will undertake the work.

The second annual New York Architecture and Engineering Exhibition, which was to be held from March 25th to 30th, will be held in conjunction with the Fire Exposition. October 2nd to 12th, constituting a department of fireproof construction and safety building equipment.

At a well-attended meeting of builders and contractors held at St. Catharines last week it was decided to organize a Builders' Exchange and the necessary preliminaries are now being arranged. A rousing address was given by Mr. Geo. Gander, President of the Toronto Builders' Exchange.

It is officially announced that the construction of 184 miles of new C. P. R. track between Montreal and Toronto is to be commenced this year. The new line will leave the present line a little west of Smith's Falls and will rejoin it between Agincourt and Toronto. The work will not be completed for two years.

Recent incorporations in British Columbia include: Canadian Builders' Supply Company, Limited, head office, Vancouver, B.C., capital $100,000; Mountain Brick & Tile Company, Limited, head office, Nanaimo, B.C., capital $25,000; British Columbia Granitoid & Contracting, Limited, head office, Vancouver, B.C., capital $100,000.

Dr. Reaume, Minister of Public Works for Ontario, has received notification that the C. P. R. will commence work on their new freight yards at Toronto this spring. The buildings are to be erected upon the site of the present Government House. Pending the completion of the new official residence for the Lieutenant-Governor, Sir Jno. Gibson will have to look around for temporary quarters.

Contrary to the belief that has been entertained for some time, the British Columbia and Alaska Railway Company, so far from abandoning their charter, will commence operation in the spring, starting from Vancouver to the northern interior. The president of the company is Mr. E. C. Harris, of New York, formerly Assistant Chief Engineer of the Chicago, Milwaukee & St. Paul Railroad.

There was a strong Canadian contingent at the Clay Products Exhibition held recently at Chicago, which was attended by nearly one thousand manufacturers and others identified with the trade from all parts of America. Among the representatives of the Canadian trade may be mentioned Mr. A. Burgess, Superintendent of the Don Valley Brick Works, Toronto; Mr. R. H. Skelton, Manager, and Mr. Andrew Dods, Secretary, of the Ontario Sewer Pipe Company, Limited, Mimico; Mr. Anton Berg, of the Berg Machinery Company, Toronto; Mr. Jas. Lochrie, West Toronto; Mr. W. C. Trotter, President of the Standard Drain Pipe Company, St. Johns, Que., and his son, Mr. H. Trotter, Manager of the Standard Drain Pipe Company's plant at New Glasgow, N.S.; Mr. W. E. McNally and Mr. J. Brebner, of Montreal.

MEDICINE HAT
ALBERTA, CANADA
MEDICINE HAT
Largest NATURAL GAS Field in the world.
This material all made in MEDICINE HAT.

Clay Products Show, Chicago—Attractive Exhibit by the City of Medicine Hat, Alta.

The Quebec Legislature has promptly vetoed the proposal of the Montreal Council to construct and operate a system of underground tramways, at an estimated cost of $5,000,000. The scheme was strongly opposed by the Montreal Tramways Company, on the ground that it interfered with their vested interests. The defeat of the proposal involves the dropping of a plan to construct a line of electric railways to Lachine along the aqueduct.

Sir Donald Mann announces that in connection with the Montreal tunnel scheme he has decided to secure the services of a New York engineer, who has had a large experience in constructing tunnels under rivers. There will be a double track through the tunnel. Mr. J. B. Perrault, the Montreal architect, has asked the Board of Control to oppose the elevated track portion of the plan, and to favor a covered trench from the waterfront to Lagauchetiere St.

From Vancouver comes the announcement that the contract for the construction of the Kettle Valley line over the Hope Mountains will be awarded early next month, and that construction work will be started not later than May 1. The section in question will have a length of forty-five miles. It is also announced that every effort will be made to finish the contract before the end of 1914, or six months ahead of the time limit, July 1, 1915, fixed by the Provincial Government.

As the outcome of the protest by Messrs. Francis & Venne, who are revising the Montreal building by-laws, the Board of Control have appointed Col. John Barry as secretary of the Committee. The committee, which is doing the work without fee, formerly had a secretary, but this gentleman was withdrawn, and the committee complained that the work was retarded owing to lack of assistance. Mr. Francis made a public protest against this want of consideration on the part of the council.

The Nova Scotia Clay Works, Limited, has been organized at Halifax with a capital of $600,000 to take over the clay works at Pugwash, Shubenacadie, Elmsdale, Avonport, Middleton, Bridgewater and Annapolis Royal. The manager of the new company, according to our information, is to be Mr. R. Macdonald, of Pugwash, a successful railway contractor and brick maker. One of the projects of the new firm is to make extensions involving an expenditure of $50,000.

At a conference held in Montreal on March 12 it was decided to oppose the Chicago drainage scheme under which the Drainage Commission desire to take 10,000 cubic feet of water per minute from Lake Michigan. Although the application is being made for drainage purposes, it is believed that the water is required for power development. The transportation companies and the Montreal Harbor Board are strongly against the application and Mr. Kennedy, the engineer of the latter body, will handle the engineering part of the opposition.

Replying to a deputation, headed by Premier R. P. Roblin, which asked for the extension of the line from Russell, Man., for fifty miles, Mr. G. J. Bury, vice-president at Winnipeg, intimated that the company had planned for ten thousand miles of line all over the country, but these could not be constructed until the main lines were double tracked and in shape to cope with the traffic from all over the system. There was no doubt that the company would have to build a great many branches through Manitoba when the boundaries were extended, and engineers were now busily engaged forming plans for the extensions that would be necessary if the Hudson's Bay outlet proved the success that was anticipated.

Belliss Engines at the Coronation Durbar

Messrs. Laurie & Lamb, Montreal, send us the following particulars to show the extensive and successful use of Belliss engines:—

"The P. & O. S.S. "Medina," in which the King and Queen went to India, has seven Belliss steam engines direct coupled to dynamos for generating electricity for lighting and power service in the ship. Each of the trains on the Bombay-Baroda & Central India Railway has a Belliss paraffin engine for lighting purposes. The special power house installed for lighting and illuminating the Durbar Camp at Delhi was equipped with five Belliss engines direct coupled to generators, some of them of 1,000 horse-power, and the King and Queen's headquarters at Circuit House, Agra, were also equipped with a Belliss paraffin engine electric lighting set. Altogether, in connection with the Imperial visit there were in use fifteen engines of Belliss & Morcom manufacture, which when used to their maximum output(as no doubt they were at the time of the celebrations), are capable of exerting a total of nearly 4,000 horse-power.

The engineer who had charge of the temporary power station erected for the Durbar reports that when full illuminations were on the whole plant was running at maximum load, but notwithstanding this the engines worked without a hitch throughout. The special Coronation Durbar Medal has been conferred on him in recognition of his services.

At a meeting of the Canadian Society of Civil Engineers, Montreal, on Thursday, March 7th—Mr. J. M. Shanley presiding—members discussed the specifications proposed by the Committee on Roadbed and Ballasting and by the Good Roads Committee. These specifications were submitted at the last annual meeting, but were referred to the various committees of the branches for discussion and report. At the meeting on Thursday, the different points in the reports were discussed in detail, the railroad classifications being criticised particularly. The difficulties with regard to classification, especially in connection with the construction of the Canadian Pacific and Grand Trunk Pacific, were pointed out. Many amendments were proposed and will be dealt with later.

Publications Received

"The Mixer" is the title of a breezy little publication issued by the Koehring Machine Company, Milwaukee, Wis., manufacturers of Koehring mixers, concrete hoists, hoisting drums, bar cutters and bar benders. The booklet contains a considerable amount of information calculated to be useful to the concrete worker, while it is enlivened by many little anecdotes concerning the Irish and others. Copies will be mailed free upon application to the company.

A pamphlet issued by the Maenofferen Slate Quarry Company, Limited, Portmadoc (London offices, 57 Moorgate street), contains much that is informative and interesting to architects and builders and all interested in roofing materials. The company was incorporated in 1861, since when its output has steadily increased. The slates produced, by reason of their superior quality, have gained a wide market in England and abroad. The pamphlet is well illustrated and the pictures enable the reader to follow a slate from its position in the solid rock, where it has lain undisturbed for countless æons, to its final resting place on the roof of a building.

The Dahlstrom Metallic Door Company, Jamestown, N.Y., are sending out copies of an artistic booklet descriptive of their doors and trim. Excellent photographs are given of some of the more noteworthy buildings in which the company's products have been employed. In the Dahlstrom metallic doors the first cost is the only cost, and the company offer to reproduce any of the color effects possible in wood. The "Dahlstrom" products are made from the highest grade metal—iron, steel, copper and bronze They include doors, jambs, casings, cabinets, partitions, wardrobes, picture and wire mouldings, capping, chair railings, in fact mouldings of every description for all purposes. The company have a branch office at 205 Maryland Street, Winnipeg, in charge of Mr. A. T. Taylor.

The building trades are brisk at Niagara Falls, Ont., where the local architects and contractors are counting upon an exceptionally busy year.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Bassano, Alta.
In the near future by-laws providing for an expenditure of nearly $200,000 upon waterworks, sewers, concrete walks, street grading, etc., will be submitted to the ratepayers. The main outfall sewer is to be constructed with a capacity large enough to serve a town of 10,000 to 15,000 inhabitants.

Bridgeburg, Ont.
Tenders are called for construction of 4 miles of stone road, 3 layers of crushed stone, different sizes, 66 ft. width, concrete tile culverts and drains. Shade trees to be planted on both sides. Cost $50,000. Boulevard Commission, Niagara Falls. Commissioner, J. H. Jackson.

Erie Beach, Ont.
Tenders will be received until April 1st by Olonzo Ellis, Ridgeway, Ont., for supply and laying of 4-in. gas pipe line from gas wells in Bertie Township to Erie Beach, Ont. Plans, etc., with owner.

Fort Erie, Ont.
Tenders to be called at end of April for granolithic walks for 1912. Estimated cost $3,000. Clerk, B. F. Matthews.

Golden, B.C.
Work will be rushed this summer on Banff-Windermere wagon - automobile road. Cost, $150,000. Owner, Provincial Government. Minister of Public Works, Hon. Thos. Taylor, Victoria, B. C.

Oak Bay, B.C.
A by-law will be submitted to raise $7,500 for waterworks system.

Oakville, Ont.
Tenders are called until April 1st for construction of main sewerage and sewage disposal works; plans at office of Engineer. Mayor, G. Hillmer. Consulting Engineer, T. Aird Murray, 303 Lumsden Bldg., Toronto.

Toronto, Ont.
Tenders are called for sewers on Benson avenue, Rushton road. Shaw street, Ilford avenue, Arlington ave. to East End. Received by Chairman until noon, March 26th. Chairman Board of Control, Mayor G. R. Geary.

The City Engineer recommends the following asphalt pavements: Barrett avenue from Chelsea to Conduit, $4,897; Tennis Crescent, from Broadview to 292 feet east, $2,246; Cobourg avenue, from Brock to east end, $2,242. Mayor, G. R. Geary.

The following sewers will be laid on local improvement system: Bertmount ave., $381.91; Hibernia ave., $406.93; Bird ave., $685.73; Indian Trail, $826.75; Brock ave., $549.77; Keele street, $1004.62; Davenport road, $1716.26; Rainsford rd., $2391.44; Dixon ave., $831.16; Ridley Gardens, $658.87; Don Crescent road, $288.43; Withrow ave., $710.98; Eaton avenue, $2319.23.

Tenders will be received by Mayor until March 28th for construction of Garrison Creek sewer, extension section No. 1. Plans, etc., at City Engineer's office. Chairman Board of Control, Mayor G. R. Geary. City Engineer, C. H. Rust.

The following sewers will be laid this summer on local improvement system: Temperance and Sheppard streets. Specifications at engineer's office. Cost $30,840. City Clerk, W. A. Littlejohn; City Engineer, C. H. Rust.

Tenders will be received by Mayor until March 26th for construction of Section No. 15, Rosedale Creek Sypho High Level Interception piping. Works covers laying of 5,700 lin. ft. of 42-in. reinforced concrete pressure pipe. Plans and specifications at Engineer's office.

Windsor, Ont.
Tenders have been called for 21,000 yards of concrete pavement, Hall and Moy avenue. Chairman Board of Wks.. Euclid Jacques. City Engineer, M. E. Brian. Specifications at office of Engineer.

Tenders have been called for 10,000 ft. brick sewer, 15 to 20 in.; 4,000 ft. brick sewers, sizes 20 in. to 30 in. Specifications at engineer's office. Chairman Board of Works, Euclid Jacques. City Engineer, M. E. Brian.

WINNIPEG, MAN.
Permission given by Council to Sprague Lumber Company to lay sewers from a point in Block 18 near Port Douglas ave. along City Lanes to sewer on Grace street.

CONTRACTS AWARDED

Ridgetown, Ont.
F. W. Farncomb, C.E. of London, Ont., has awarded the contract for the installation of the pumping equipment consisting of one Fairbanks-Morse 60 h.p. natural gas engine; one Fairbanks-Morse 40 h.p. gasoline engine, 2 Smart-Turner double acting triplex power pumps and three Goulds deep well pumps to the Canadian Fairbanks-Morse Co., of Toronto, for $7,500. The installation to be completed June 1, 1912. The contract for the power house and pump well has been awarded to Geo. Poag, of Ridgetown.

Winnipeg, Man.
Canada Iron Corporation, Ltd., Montreal, will supply the following: 1,000 lin. ft. of 4-in. c.i. water pipe. 15,000 lin. ft. of 6-in. c.i. water pipe. 12,000 lin. ft. of 8-in. c.i. water pipe at $37 per ton.

Railroads, Bridges and Wharves

Brandon, Man.
Tenders are called for an addition to engine house for Canadian Pacific Ry. Divisional Engineer, Frank Lee, Winnipeg. No date given for closing of tenders.

Cape Cove, Que.
Tenders are called for completion of extension to pier. Plans etc., at offices of District Engineers, at Quebec and Montreal and on application to local postmaster. Received until 4 p.m. Mar. 26th, by Secretary. Dept. of Public Works, Ottawa; Secretary, R. C. Desrochers.

Chatham, Ont.
Tenders will be called shortly for repairs to bridge on William street. Interested, Aldermen Lister and Westman. Repairs to consist of new iron work, complete flooring, etc.

Goderich, Ont.
The Canadian Pacific Railway Company have plans at Toronto office for erection of new freight sheds here.

Halifax, N.S.
The Department of Militia & Defence, Ottawa; Admiral Kingsmill, propose to build new dockyards at cost of $1,300,000.

Hamilton, Ont.
City Engineer, A. F. Macallum. Mayor, Geo. H. Lees. The city is considering the erection of an overhead bridge over 5 sets of tracks on Lottridge street.

The Toronto, Hamilton & Buffalo Ry. will erect a new steel bridge and concrete abutments to replace wooden bridge at Birch avenue.

Jeanette, Ont.
The C. P. R. will locate a new station to be known as Jeanette, between Ringold and Tilbury. Cost $6,500, and will be started immediately. Chief Engineer at London has plans. All interior fittings, seating, heating and lighting equipment needed.

Lethbridge, Alta.
Grand Trunk Pacific Railway Co., Montreal, plan to erect a new union station. The railroad to enter city by overhead bridge.

London, Ont.
Tenders will be received by engineer until March 31st for construction of following steel bridges:—one 150 ft. span 16 ft. roadway bridge, estimated cost, $9,000; one 50 ft. span, 16 ft. roadway bridge, estimated cost $2,200; two 45 ft. span, 16 ft. roadway bridges, estimated cost, each, $1,500. Plans and location, etc., at office of county engineer. Engineer, Chas. Talbot, London.

Ottawa, Ont.

An application to Provincial Parliament will be made next session for an act extending the time within which the construction, completion and operation of the Ottawa & Morrisburg Electric Railway shall be carried out.

Regina, Sask.

Appropriation has been made for extension of street railway system, cost $200,000. Address, Superintendent Doughty or City Commissioner McPherson.

St. Thomas, Ont.

A by-law will be submitted providing for street railway extension, cost $30,000. Three new street cars; repairs to old cars. Repairs to overhead work; 60 lb. steel rail on lines to be extended. City Engineer, M. H. Baker.

Toronto, Ont.

Debentures will be issued for following bridges: Crawford street reinforced concrete bridge, $29,450; Strachan ave. bridge, 2 steel plate girder spans, $58,200. Cattle Market steel lattice girder bridge, $14,900. Riverdale foot bridge, etc., $12,000. Gerrard street bridge, steel, $151,800, or if concrete, $200,000. Mayor, G. R. Geary. City Engineer, C. H. Rust.

Winnipeg, Man.

Tenders will be called shortly for repairs to bridge, cost $12,450, over C.P.R. yards. Cedar blocks to be used for paving approaches. City Engineer, H. N. Ruttan, 223 James avenue.

CONTRACTS AWARDED

Fredericton, N.B.

The following bridge contracts have been awarded: Hunters Ferry Bridge—Frank L. Boone, St. Marys, N. B., $23,000. Coles Island Bridge—R. & C. Forbes, Gibson, N.B., $10,000. Burpee Bridge—R. & C. Forbes, Gibson, N.B., $7,000. Chase Bridge—Frank L. Boone, St. Marys, $2,500. Provincial Government. Secretary, H. M. Blair. Chief Commissioner, Morrissy.

Toronto, Ont.

Freight sheds to cost $3,000, Cherry street near Front, for Canadian Northern Railway. Architect, Geo. Briggs, Toronto street. Builder, Imperial Construction Co., 2 Toronto street. One-storey, frame, covered with galvanized iron; frogs, track switches, etc. required.

Public Buildings, Churches, Schools, etc.

Bassano, Alta.

A by-law to raise $25,000 for the erection of a town hall will be submitted to the ratepayers within a month.

Berlin, Ont.

Architect Cowan has the plans for a 2-storey brick and stone school, and tenders will be let shortly.

Cranbrook, B.C.

Plans are being prepared for new school for Public School Board. A site has been purchased and work will be started in near future.

Tenders will be called shortly for addition to club building for Men's Club Architect, F. S. Rosseter. Building 60 ft. x 30 ft., concrete foundation, gymnasium, galleries and meeting rooms, swimming pool 20 ft. x 40 ft. and complete equipment. Boilers, shower baths, 100 lockers, lavatory.

Crown Point, Ont.

Baptist Church Extension Board, Hamilton, are planning to erect a new church to cost $10,000.

Farmers' Union, Ont.

Tenders are called for school in S. S. No. 5, Oxford. Secretary, J. L. Newman, Secretary School Board S. S. No. 5, Oxford, Farmers' Union. Received by secretary until noon, March 22.

Golden Lake, Ont.

Tenders are called for Indian school house on Golden Lake Reserve. Department of Indian Affairs, Ottawa. Secretary, J. D. McLean.

Hamilton, Ont.

Plans are being prepared for Club House to cost $10,000, near Ancaster, for Country Club. Interested, Geo. Lynch-Staunton, Bank of Hamilton Building, Hamilton. Architect, J. A. Armes, Federal Life Bldg., Hamilton. Rustic stone work.

Kamloops, B.C.

By-laws to raise $30,000 for school purposes will be submitted to ratepayers. L. A. Palmer, secretary School Board.

Medicine Hat, Alta.

$25,000 will be spent in the erection of an Immigration Building this year. Owner, Dominion of Canada. Minister of Interior, Robt. Rogers, Ottawa.

Middle River, N.S.

Tenders are called until April 1st for school residence. Department of Indian Affairs, Ottawa. Secretary, J. D. McLean. Construction of teachers' residence, frame. Plans, etc., at Indian Agents at Sydney and Baddeck; at office of Indian Supt., River Bourgeois, and at Inverness post office.

Montreal, Que.

Stanley Street Presbyterians have sold their former site on Stanley street and have secured new property in the western section for the erection of a new church.

Work will commence shortly on a school on Mance street near Pr. Arthur, for Protestant School Commissioners. Architects, Nobbs & Hyde, 49 Beaver Hall Hill, Montreal. Three storeys, 27 rooms, fireproof throughout.

Plans are prepared for school on Esplanade and Van Horne avenue, for Protestant Board of School Commissioners. Architect, Nobbs & Hyde, 49 Beaver Hall Hill, Montreal. 3-storey, fireproof, 24 class rooms. Canadian Domestic Engineering Co., Ltd., 5 Beaver Hall Hill, Montreal, are working on plans for heating, ventilation & plumbing.

The Canadian Domestic Engineering Co., Ltd., 5 Beaver Hall Hill, are preparing plans for the new heating and ventilation system for St. Bridget's Catholic School, Maisonneuve and St. Rose street. Private tenders called about March 25th; close April 9th.

New tenders are called until March 22nd for extension to theatre for H. Pulos, prop., Wonderland Picture Theatre, 339 St. Lawrence Blvd., Montreal. Architect, D. J. Crighton, Jacobs Bldg., Montreal.

The Kinemacolor Co. of Canada have chosen sites on St. Lawrence Blvd. above St. Catherine west, for the erection of three moving picture theatres.

New Hamburg, Ont.

The matter of building a new library will be taken up at once by the local Library Board and the Council. An effort will be made to try and have a Carnegie Library built. Mr. T. Sterling is president and has the matter in hand.

Newmarket, Ont.

Town Clerk, J. E. Hughes. Ratepayers will vote on by-law to raise $28,000 for schools.

Niagara Falls, Ont.

Chairman, Mayor C. C. Cole. City will vote on by-law to raise $15,000 for Collegiate extension.

Oshawa, Ont.

A new school to cost $32,000 is being considered by Oshawa Council. Clerk, Thos. Morris, Oshawa. Reeve, Mitchell.

Ottawa, Ont.

Plans are being prepared for "Brethren" Hall to cost $14,000, McLaren St., for Peden & McLaren, 20 St. Alexis street, Montreal. Interested, S. H. McDowell, 20 St. Alexis street, Montreal. 40 ft. high, 61 x 28, concrete foundation, steel beams, hardwood floors, hot water heating, electric lighting, tar and gravel roofing, ornamental iron. Tenders called in about two weeks.

Board of Control approved of Fire Chief Graham's recommendation of Arthur street north of Somerset as the site for new Fire Hall to replace No. 7. Cost $25,000.

A site has been secured for erection of a church to cost $70,000, on Lyon & Secord avenues, for Methodist Church, Glebe District. Architect, E. J. Burritt, Sparks Chambers, Ottawa.

Owen Sound, Ont.

The by-law carried to grant concessions to Aetna Rubber Company, Cleveland; President, E. D. C. Bayne, for erection of a 2-storey brick factory. E. Lemon, Mayor.

Pembroke, Ont.

Plans have been selected for Carnegie Public Library, cost $13,000. Clerk, A. J. Fortier; architect, F. C. Sullivan, Bank of Ottawa Bldg., Ottawa. Stone and brick, ground floor contains ladies reading room, reference room, general reading room, children's room and stack room; capacity 10,000 volumes.

Red Deer, Alta.

Architect Julian Sharman has prepared plans for extension of municipal offices to cost $10,000, 60 x 30, steam heating. Clerk, A. S. Stephenson.

It is proposed to build an extension to hospital to cost $10,000. Clerk, A. E. Stephenson. Chairman Hospital Board, F. H. Tallman. Brick, steam heating. Town will vote on grant in 2 months.

The Sons of England Society have purchased a site on 3rd street for the erection of a Lodge Hall to cost $4,000.

Regina, Sask.

The Roman Catholic Church contemplate erecting a cathedral, college and

Bishop's place. Address Bishop Mathieu, Bishop's Place, Regina. Part of work will be done this summer . No architects are yet appointed.

The Public School Board have plans prepared by School Architect J. H. Puntin for erection of new technical school and two ordinary schools.

A site has been secured for college on 16th avenue, for Anglican Church of Canada. Address, Bishop Harding or H. V. Bigelow, both of Regina.

Sarnia, Ont.
There is a strong movement under way to build a new Court House instead of repairing old building damaged by recent fire. Mayor McGibbon has matter in charge.

Saskatoon, Sask.
Tenders closed March 20th for Parish Church, for St. John's Parish, for all trades above ground level, also basement interior fittings. Plans at office of architects and at Builders' Exchange, Winnipeg. Architect, Thomson, Daniel & Colthurst, 410 Drinkle Bldg., Saskatoon, P.O. Box 281.

Funds are being raised for Army Citadel, 20th street, to cost $35,000, for Salvation Army. Building Supervisor, J. W. McBain, Winnipeg. Architect, Major Miller, Toronto. Three storeys, brick, 40 x 70, with basement.

St. Catharines, Ont.
The council is considering the erection of a new fire hall. A site has not yet been secured. Mayor, Dr. Merritt. City Clerk, J. A. Ray.

Stratford, Ont.
Clerk, R. R. Lang. Plans will be prepared for a new building. To be erected as an addition to fire hall. Cost $12,000.

Plans will be prepared for market building to cost $12,000. Mayor, J. Brown. City Engineer, Ferguson. A by-law will be submitted shortly to provide for the necessary expenditure.

Sydney, N.S.
Repairs to cost $5,000 will be made to County of Cape Breton jail. County Clerk, D. M. Curry, Sydney, N.S. Repairs to consist of cement and new roof probably. A concrete fence 10 ft. high, 100 ft. long with iron or steel spikes on railing along top will also be constructed.

Toronto, Ont.
Plans are about completed for vaudeville and picture theatre to cost $3,000, Dundas and Mavety, for R. J. Bruce, 1713 Dundas street. Architect, Percy Wright, 332 Clendenan avenue. 1-sty., brick and steel, tar and gravel roofing.

Plans for the Dominion Building of Can. National Exhibition are being altered and will be refigured. Architect, Geo. Gouinlock, Temple Building.

The following amounts will be raised for construction of fire halls: Greenwood avenue fire hall, $30,000; Wychwood fire hall, $30,000; Roncesvalles avenue fire hall, $25,000; addition of stable and supply store, Adelaide street, $8,000. Earlscourt fire hall, $25,000.

Windsor, Ont.
Tenders are called for school to cost $35,000, Park street, for Windsor Separate School Board; President, Gaspard Pacaud, Windsor; secretary, D. Gourd, Windsor; architect, Jacques & Co., Windsor; 2-sty. and basement, brick, stone and concrete, concrete foundation, electric light, steam heating, prepared roofing, Georgia pine finish, boilers, 8-room school, equipment, desks. Received by architect until March 20th.

Winnipeg, Man.
Tenders are called until April 1st for school, Brittania, St. James street, for Public School Board. Architect, E. D. Tuttle, 701 McArthur Block; 2-sty. and basement, 70 x 200, brick and stone, stone foundation, steam heating, electric lighting, asbestos and slate roofing.

Plans will be prepared for College to cost $50,000, Port and Spencer streets, for Board of Directors Wesley College. Architect, J. H. G. Russell, 1111 McArthur Blk., Winnipeg.

Grace Church Congregation have secured property on Graham and Smith streets as a site for a new church.

Woodstock, Ont.
Council to be asked to submit by-law to ratepayers to provide for expenditure of $60,000 for a new City Hall. Clerk, John Morrison.

CONTRACTS AWARDED

Calgary, Alta.
A permit has been granted for alterations to Church of the Redeemer, to cost $4,000. Architect, Lang & Major. General contractor, H. Sylvester, sr., Calgary.

Guelph, Ont.
Building for Young Men's Christian Association. Architect, Mills & Hutton, Hamilton, and W. A. Mahoney, Guelph. Stone and brick work, Johnson & Williams; carpentry, Cowan & W. Walker; plumbing, Stephenson & Malcolm; electric work, Grinyer & Co.; heating, F. Smith; tin and roofing, Dennis and Bennett.

Kingston, Ont.
The contract for new Dormitory at Royal Military College has been awarded to Michael Sullivan, of Kingston.

London, Ont.
Church, cost $35,000, for Congregation of St. Michael's; Rector, Father Hanlon. Architects, Moore & Munroe, London. Contractor, John Keyes, Stratford. Work will commence as soon as possible.

Montreal, Que.
Club House and Curling Rink to cost $20,000 on St. Matthews street, for St. Andrews Club, Montreal. Builders, St. Andrews Land Co., 29 University street, Montreal. To be built this summer. Club House 30 x 68, rink 40 x 68.

Protestant Board of School Commissioners plan to build an addition of 4 rooms to the Sarah Maxwell School. The proposed improvement to Lansdown school will not be carried out. Architects, Nobbs & Hyde, Beaver Hall Hill, Montreal.

Regina, Sask.
Reinforced concrete frame is completed for Ladies' College, cost $250,000, for Methodist College Board. Registrar, Rev. Mr. Davis; general contractor, R. J. Lecky, Regina. Three storeys, 24 x 60, brick and stone, steam heating, fireproof, passenger elevators. General college, dining room and kitchen equipment.

Sherbrooke, Que.
School to cost $40,000 on Larocque street, for Catholic School Commissioners. Architect, J. W. Gregoire, Sherbrooke. General contractor, Simoneau & Diau, Sherbrooke, Que. Foundations in. Three storeys, 80 x 140, brick and structural steel, stone foundation, metal roofing, steam heating, hardwood finish.

Truro, N.S.
Civic Building. Clerk, H. McDougall. Architect, Leslie R. Fairn, Avelsford, N. S. Gen. Contractor, Rhodes Currv Co., Ltd., Amherst, N.S., $37,745. Stone and brick; heating and plumbing not included in general contract.

Windsor, Ont.
School. General contractor, Euclid Jacques. Excavation and masonry, Thomas Bros. Painting and glazing, Hossing. Plumbing and heating, Pennington & Brian. Iron work, Thos. Blackburn; all of Windsor. Board of Education; Secretary, A. Black. Architects, Jacques & Company, Windsor.

Residences

Aylmer, Que.
Plans are being prepared for summer cottage, cost $4,000, for S. Gamble, Ottawa. Architect, J. P. McLaren, 104 Sparks street, Ottawa.

Calgary, Alta.
Plans are being prepared for apartment Block for V. Anderson, 230 4th avenue west. Architect, R. B. Whitten, 505 Beveridge Block; 4-sty., 100 x 120, fireproof.

Plans are prepared for residence to cost $4,000, Mount Royal, for A. S. McTavish, 310 4th avenue east. Architect, Burroughs & Richards, Calgary. 2-sty., brick veneer, concrete foundation, electric lighting, steam heating, shingle roofing, hardwood finish.

A permit has been granted for residence to cost $5,000, La Grange, for J. Steinbrecker, 9th avenue west. Two-storey, 26 x 38, brick veneer, concrete foundation, steam heating, electric light, shingle roofing, hardwood interior finish.

Plans are being prepared for apartments to cost $10,000, for Mr. Sibley, 8th avenue east. Architects, Burroughs & Richards. Two-storey, 38 x 62.

A permit has been granted for residence to cost $4,000, Elbow Park, for S. H. Haslam, 222 15th avenue east. 2-storey, 25 x 40, frame, concrete foundation, hot air heating, electric lighting, shingle roofing.

A permit has been granted for residence and garage to cost $26,000, Mt. Royal, for C. Tranuciser, 124 4th avenue east, Calgary. 2½ storeys, 40 x 50, brick veneer, concrete foundation, steam heating, electric lighting, shingle roofing, hardwood interior finish.

Chatham, Ont.
Wm. Gray & Sons Carriage Company are applying for permit to erect six houses on Queen street. Cost $12,000.

Crumlin, Ont.
Wm. C. Smith is planning a new residence to replace one destroyed by fire. Cost $3,000.

London, Ont.
Plans are being prepared for residence to cost $4,000 for John Harvey. Archi-

tects, Watt & Blackwell, Bank of Toronto Chambers, London. Two-storey, brick, hot water heating, electric lighting. Work to start in spring.

Montreal, Que.

Plans are being prepared for residence to cost $20,000 for J. N. Laing, 110 St. Mark street. Architect, K. G. Rea, Beaver Hall Hill

Excavation is done for 3 flats to cost $3,500, Chapleau street, for Joseph Lefebvre, 1300 Chapleau street; 3-storey. 25 x 60, brick, concrete foundation, gas ltg., gravel and tar roofing.

Work will commence shortly on four dwellings to cost $18,000, Melrose Lawn, for L. C. Farlton, 393 Wiseman avenue, Montreal. 2-storey, 25 x 48, brick, concrete foundation, hot water heating, electric lighting, tar and gravel roofing.

Excavation will start on a residence to cost $6,000, Vendome street, for Jas. Kerr, 374 Grosvenor avenue. Architect, Geo. Sleep, 20 Charron street. Two storeys, 25 ft. by 51 ft., rustic and plastic brick, stone foundation, electric ltg., hot water heating, gravel roof.

Plans are being prepared for two semi-detached residences, Wolsley ave., for J. H. Lauer, Eastern Townships Bk. Bldg. Designer, E. W. Barnes, 2126 Mance street, Montreal. Two storeys and basement, 56 x 35, brick veneer, concrete foundation, electric lighting, hot water heating, asbestos shingle roof, hardwood finish, modern open plumbing. To start in spring.

St. Thomas, Ont.

Tenders will be called in April for residence to cost $4,500 on Ross street, for G. P. Smith, St. Thomas. Architect, J. T. Findlay, St. Thomas Two-storey, 36 x 35, solid red pressed brick, cement foundation, hot water heating, electric light, slate roofing

Toronto, Ont.

Tenders are open for residences to cost $12,000, on E.S. Brock ave., for Annie M. Baird, 541 Margueretta street. Two-storey, stone, brick and stucco, tar and gravel roofing.

Tenders are open for apartment house to cost $10,000, cor. Borden and Vankoughnet streets, for H. W. Sharp, 19 Adelaide street, Toronto. Architect, J. Gladwin Hedges, 86 Clinton street, Tor. Two-storey and basement, brick, steam heating, concrete floors, cut stone, mantles, tiles, hardwood finish, plate and art glass, galvanized cornice, ornamental iron, tar and gravel roofing.

Tenders are open for pair residences to cost $5,000, Laughton avenue, for G. Heit, 151 Maria street; Two-storey, tar and gravel roof.

Plans are completed for detached dwelling to cost $3,000 at 33 Balsam ave. for E. G. McBride, 58 Wheeler avenue, Toronto. Architect, T. R. Hollingsworth, 146 Beech avenue; 2½ storeys, brick, mantles, tiles, hardwood finish, plate glass, shingle roofing.

G. K. Holladay, 213 Dunn avenue, is planning to erect a pair of 2-storey brick houses on Cowan avenue, near Springhurst to cost $6,500.

Plans are prepared for 3 attached residences to cost $6,000, E.S. Emerson ave., for Geo. Pearson, 2 Division street. Architect, G. Gladwin Hedges, 86 Clinton street. Two-storey, 42 x 40, solid brick, stone foundation, shingle roof, hot air heating, combination lighting, cut stone, mantles, plate and art glass. Tenders received by owner.

Tenders are open for addition to rooming house to cost $7,000, 244 Church street, near Wilton, for J. E. Gray, 449 Yonge street. Architect, Bovell & Molesworth; 3-sty., brick, gas lighting, structural steel, tile coping, hardwood finish, reinforced concrete floors, plate and art glass, galvanized cornice, picture moulding, tar and gravel roofing.

Tenders are open for residence to cost $3,200, E.S. of Bartlett avenue, for Walter Buckhurst, 13 Bartlett avenue. Architect, H. J. White, Mount Dennis, Ont. 2½-sty., brick, concrete foundation, tar and gravel roofing.

A permit has been granted for pair residences to cost $4,600, Montrose ave., for J. A. Thompson, 258 Beatrice St.; solid brick, tar and gravel roofing.

Tenders are open for 3 pair dwellings to cost $10,000, S.W. cor. Queen and Laing, for G. Buchner, 180 Booth ave. Architect, P. H. Finney, 43 Victoria. Semi-detached, brick, rough cast, frame and brick veneer front, tar and gravel roofing.

Plans are in progress for residence to cost $15,000, Indian road and Howard Park ave., for G. S. Ranson, 72 King street east, Toronto. Architect, F. A. Ransom. 2½-sty., brick, stone foundation, cut stone, hardwood finish, billiard room, smoking room, fancy hardware, ornamental collonades, tile roofing. Owner, is builder.

Plans are in progress for apartments to cost $12,000, Howard Park avenue, for G. S. Ransom, 72 King street east, Toronto. 3-sty. and basement, brick, tar and gravel roofing.

Plans are drawn for 3 attached residences to cost $6,500, Glendale ave. and Garden, for H. E. Ling, 5 Galley ave. Architect, A. Holines, 408 Salem ave. 2½-sty., brick, stone foundation, tar and gravel roof.

A permit has been applied for to erect 2 pair residences to cost $8,000, N.S. Mallon avenue, for Thos. Edmonds, 139 Symington avenue; 2-sty., brick, stone foundation, tar and gravel roofing.

Tenders are open for 3 attached residences to cost $11,000, E.S. Osler ave., near Royce, for T. J. Colley 86 Edwin avenue. 2-sty., brick.

Plans are in progress for detached residence to cost $3,000, 26 Edgewood Crescent, for A. A. Kennedy, 36 Edgar avenue. Architect, P. H. Finney, 43 Victoria street. Builder is owner. 2½-sty., detached, brick, stone foundation, shingle roof, hot water heating, hardwood finish.

Tenders are open in the lesser trades required for tenement house to cost $12,000, 373 Dundas street. Owner, Herbert C. Roberts, 16 Foxby street. 2-sty. and basement, brick, concrete foundation, tar and gravel roof, hot water heating, stucco, concrete floors.

Tenders are open for 3 residences to cost $7,500, 4 Dixon avenue, for D. B. Banermann, 3 Lamport avenue. Architect, P. H. Finney, 43 Victoria street; 2½-sty., brick, tar and gravel roof.

Plans are completed for pair residences to cost $5,000, 806 College street, for R. H. Graham, 802 College street. Architect, W. P. Graham. Builder, owner. 2-sty., brick., stone foundation, tar and gravel roof.

Plans completed for residence to cost $3,000, NS. Temple avenue, for W. B Charlton, 140 Close avenue. 2½-sty., brick, tar and gravel roofing, hot water heating, gas fire places, also coal ditto.

Walkerville, Ont.

Tenders are called for erection of a residence, Devonshire road, for J. Herrigton Walker. Architects, Burroughs & Wells, Detroit, Mich. Brick, steam heating, electric light, shingle roof, Received by architect until March 22.

Westmount, Que.

Plans are being prepared for three apartment houses, Western, near Olivier avenue, for L. H. Jacobs, 356 Wood avenue, Westmount. Architect, Finley & Spence, Beaver Hall Hill, Montreal.

Plans are being prepared for five residences on Mount Pleasant avenue, for A. J. Darling, 73 St. Luke street, Montreal. Architect, J. Rawson Gardiner, Beaver Hall Hill, Montreal. 2-storey.

Winnipeg, Man.

Residence and garage will be built on Yale avenue for E. C. Ryan, of Ryan Agency, 158 Portage ave. E. Architects, Ross & McFarlane, 928 Union Bank, Winnipeg. Two and a half storeys, 40 x 45, brick and cement stucco, stone foundation, steam heating, electric lighting, shingle roof, hardwood finish. Plans are being prepared and tenders will be called by architects shortly.

CONTRACTS AWARDED

Calgary, Alta.

A permit has been granted for residence to cost $5,000, for D. P. Harrigan, 240 18th avenue W., Calgary. Two-sty., 26 x 28, brick veneer, concrete foundation, hot air heating, electric lighting, shingle roofing, hardwood interior finish. Owner is builder.

A permit has been granted for room-in house to cost $10,000, for F. C. Lowes & Company, 1st street west. General contractor, W. Tosh, 15th ave. west, Calgary. Two storeys, 70 x 73, frame, hot air heating, ruberoid roofing.

Eglinton, Ont.

Residence to cost $4,000 for Forsey-Page, Confederation Life Bldg., Toronto. Architect, Owner. Masonry, T. Palmer, Toronto. Carpentry, T. J. Madill.

Hamilton, Ont.

Contractor F. S. Depew, St. Matthews avenue, will erect 20 frame houses. Location: 8 frame houses, $10,000, Wilson street; 6 frame houses, $7,900, Birch avenue; 1 frame house, $1,250, Sherman avenue; 5 frame houses, $6,300, Trolley street.

Montreal, Que.

Excavation has started for five flats to cost $5,500, 140 Visitation street, for J. Z. Ducharme, 926 St. Catherine E., Montreal. General contractor, Ernest Blais, 207 Gauthier street, Montreal. 3-sty., 35 x 54, stone front, stone foundation, electric and gas lighting, furnace heating, gravel roof.

Residence to cost $3,000, King Edward Blvd., for A. Messier, 43 Windsor street, Montreal. General contractor, Joseph Dews, 107 Belgrave, Montreal 2-sty., 25 x 30, wood and brick, concrete foundation, hot water heating, electric lighting, gravel roofing.

Work has started on three flats, cost $8,500, Esplanade, for Joseph Landry, 1497 St. Lawrence. Contractor, H. Papineau, 880 Mount Royal ave. Three storeys, 30 x 84, stone foundation, electric lighting, gravel roofing.

Ottawa, Ont.

Residence, cost $8,500, Monkland, for A. J. Stephens, 51 James street, Ottawa. Architect, W. H. George, Queen street, Ottawa. General contractor, G. Eaman, Davis and Rundell, Ottawa. 3-sty., 27 x 55, brick veneer, electric lighting.

Residence, cost $33,000, Daly avenue, for A. F. Ahearn, Albert street, Ottawa. Architect, W. F. Noffke, Central Chambers, Ottawa. General contractor, Hollbrook & Son and Smith Bros., 425 Somerset street, Ottawa. Two and a half storeys, 81 x 33, brick, stone foundation, electric light.

Apartments, cost $7,500, on Somerset street, for Mr. Amey and Mr. Rolston, Ottawa. Architect, J. P. McLaren, 104 Sparks street, Ottawa. Contractor, S. J. Hunt, 64 Oliver street, Ottawa. Brick, concrete foundation, electric lighting, four stores on ground floor; four apartments above.

A permit has been granted for residence, cost $2,800; on Glen street, for Samuel Lucy, Riverdale and Sunnyside, Ottawa. 24 x 30, brick veneer, concrete foundation, electric light, Owner is builder.

A permit has been granted for alterations to apartments to cost $10,000, Cooper street, for J. P. Band, 365 Frank street, Ottawa. Brick construction. Owner is builder.

Brick work has commenced on six residences, cost $6,000, Crichton street, for M. C. Neate, Sussex street. Architect, A. Keefer, Sparks street. Masonry, A. Kauffman, Stanley ave., Ottawa. 2-sty., hot air heating, electric light, tar and gravel roof.

Toronto, Ont.

A permit has been granted for pair residences to cost $5,000, N.S. Springhurst avenue, for J. W. Silverthorn, 46 Manchester avenue. Builder is owner. 2½-sty., semi-detached, brick, tar and gravel roofing.

Two pair detached residences to cost $8,000, Mutual street north of McGill, for Mrs. Bland, Mutual and McGill sts. Architect, P. H. Finney, 43 Victoria st. Builder, H. Williams, 6 Givens street. 2½-sty., solid brick.

Residences and offices to cost $8,000, 502-4 Spadina avenue, for W. Kahnert, 394 Huron street. Architect, Sidney H. P. Watson. Builder, Walter Davidson Co., 188 Duke street. Brick and concrete, tar and gravel roofing, electric light, sky-lights, concrete floors.

Two pair detached houses to cost $10,000, McGill street, for Mrs. Bland, Mutual and McGill streets. Architect, P. H. Finney, 43 Victoria street. Builder, W. Williams, 6 Givens street. 2-sty., solid brick.

Residence to cost $5,500, Westminster avenue, for Mary C. Littlefield, 167 McDonald avenue. Architect, J. Stewart Rankin, 52 Chelsea avenue. Builder, Rankin Bros. 2-sty., brick, stone foundation, shingle roofing, hot water heating, electric lighting, cut and art stone, mantles and tiles, plate and art glass.

Addition to residence to cost $6,000, 4 Orde street, for Toronto Conservatory of Music. Architect, Jno. M. Lyle, Leader Lane. Builder, A. Weller & Co., 54 Tecumseh street. 3-sty., brick, slate roofing, structural steel, sky lights, galvanized cornice, concrete floors.

Residence to cost $9,000, Elm ave., for Howard Blachford, Yonge street. Architect, Curry & Sparling, 90 Yonge street. Masonry, Smallwood Bros. Brick.

Business Buildings and Industrial Plants

Bassano, Alta.

Plans are being prepared for stores and offices, on 2nd avenue, for G. F. Watson, jeweller, Winnipeg, Man., c/o Watson-Sterling Company, 350 Portage avenue, Winnipeg. Architect, R. B. Whitten, 505 Beveridge Block, Calgary.

Calgary, Alta.

The Alliance Investment Co., 1st St. west, are planning to erect a six-storey warehouse, 50 x 120 ft.

Chatham, Ont.

Mayor Anderson is behind a project to bring a big Canadian branch of an Ohio firm to Chatham, and the ratepayers will be asked to vote on the bylaw shortly. A $75,000 plant will be equipped if it carries.

Cranbrook, B.C.

Fink Mercantile Co. have plans under way for a new warehouse on Durick street. Stone foundation, galvanized iron construction.

Fergus, Ont.

Canadian Cereal Co., Fergus; superintendent, Mr. Flynn, are negotiating with town for fixed assessment etc. New mills will be built and elevators erected. Estimated cost $26,000.

Hamilton, Ont.

Plans are being prepared for hotel for Hotel Cecil Company, Pres. Daniel McCormack. Architect, J. A. Armes, Federal Life Bldg., Hamilton.

Bulk and separate tenders will be received by Mr. J. Wall, general manager of British-Canadian Canners, Ltd., Lister Blk., Hamilton, Ont., for the several works required in the erection of canning factories, warehouses, etc., at Cobourg, Bowmanville, Port Robinson, Merlin and Highgate, Ont. Tenders close at noon, Saturday, March 23. Plans and specifications may be seen at the residence of the local manager at above places, and at the company's offices at Hamilton, and at the offices of Munro & Mead, architects, Chancery Chambers, Hamilton.

Jordan, Ont.

Tenders are called for canning factory for Dominion Canners, Ltd., head office Hamilton. Two 2-sty. buildings, 40 x 150, concrete and brick, concrete foundation, gas and electric light, steam heating, gravel roof. Tenders called by Hamilton office of company.

Maisonneuve, Que.

Plans are being prepared for branch bank for Bank of Hochelaga, Montreal. Architect, A. H. Lapierre, 51 Trust & Loan Bldg., 30 St. James street, Montreal. Leased premises, corner of St. Catherine street and 3rd avenue to be fitted up as branch bank.

Bank of Montreal are planning to build shortly a branch on cor. of Notre Dame street and Second avenue. In meantime will rent premises on First avenue.

Medicine Hat, Alta.

Tenders are called for business block for W. R. Hull, Calgary. Architect, F. J. Lawson, Norman Block, Calgary. 3-sty., 125 x 130. Plans, etc., at office of Mr. Williams, Medicine Hat, at office of the architect, Calgary, and at Builders' Exchange, Winnipeg. Received by F. J. Lawson until March 25th.

Montreal, Que.

Tenders are called for alterations to stores, 237 St. Catherine street, for F. W. Cross, 407 St. Catherine street. Architects, House of Brown, 207 St. Catherine street New store front and remodelled interior. Barber shop in basement. Received by architect until March 20th.

Merchants Bank of Canada, Montreal, are planning the remodelling of premises at 672 Centre street, for banking purposes. Work will be done as soon as possible after May 1st.

Work will start after May 1st on a new 8-storey office building, St. James street, for Royal Trust Co., 107 St. James street, Montreal. Architect, McKim, Meade & White, New York. The old premises will be demolished.

Architects, Dufort & Decary, LaPatrie Bldg., city, are preparing plans for stores and light manufacturing building on St. Lawrence Blvd. and Duluth avenue, to cost $45,000, for H. Levy, 198 McGill street.

P. Papliger & Steinberg, 697 St. Urbain street, Montreal, are having plans prepared by Architect, Robert Findlay, 10 Phillips Pl., Montreal, for a store to cost $15,000, on N. E. corner Prince Arthur and St. Dominique streets. Two-storey, 54 x 145, brick, masonry foundation, electric and gas lighting, hot water heating, gravel roof, concrete floors.

Moose Jaw, Sask.

The Moose Jaw Dairy Company are planning to erect a new dairy plant this year.

Nelson, B.C.

Work will start in April on stores and offices to cost $6,500, Ward and Victoria street, for J. E. Annabelle, Nelson. Two-storey and basement, brick and stone construction, electric lighting, steam heating, metal roof, telephones, electric work.

Niagara-on-the-Lake

Union Jack Canning Co. have applied for a permit to erect an addition 25 x 75 ft. to their canning factory.

North Bay, Ont.

Tenders are called for erection of addition to Registry and Land Titles Office, including separate tenders for plumbing, heating and electric wiring. Plans, etc., at the Department and at Registry office, N. Bay. Received by secretary until March 26th, 1912. Public Works Department; Sec., H. F. McNaughton, Toronto.

Ottawa, Ont.

Dominion Government plan to pur-

(Continued on page 73)

Tenders and For Sale Department

To Architects and Engineers

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

Tenders and Designs for an Aqueduct

Canadian Pacific Railway Company

Department of Natural Resources
Irrigation Branch

Sealed tenders, addressed to the undersigned and endorsed "Proposal for Brooks Aqueduct," will be received up to noon of **May 1st, 1912.**

The site of the work is about four miles southeast of Brooks, Alberta, a station on the main line of the Canadian Pacific Railway, 125 miles east of Calgary. The aqueduct is about 10,000 feet long and 54 feet maximum height, and is designed to discharge 910 cubic feet per second.

Tenders will be received based either on the design prepared by the Company's Engineer or on designs to be submitted by the bidder. The Engineer's design involves the furnishing and placing of about 23,400 cubic yards of concrete and 3,640,000 pounds of reinforcing steel, together with excavation and filling to the amount of 40,000 cubic yards.

All labor and materials required will be at the expense of the Contractor.

Bidders will be required, either personally or by representative, to visit and inspect the site and satisfy themselves as to local conditions, supply of material, etc.

Plans, specifications and full information may be obtained on application to A. S. Dawson, Chief Engineer, Calgary.

A deposit of $300 will be required before plans or specifications will be given out, which will be returned on receipt of the same in good condition.

All proposals must be accompanied by a certified cheque payable to A. S. Dawson, for five per cent. of the amount of the tender, to be forfeited as liquidated damages in case the bidder neglects or refuses to enter into a contract should the work be awarded to him.

Proposals will not be considered unless made on the form provided. Interlineations, alterations or qualification prices, except as therein provided for, may invalidate porposals.

The Company reserves the right to reject any or all tenders and to waive defects.

A. S. DAWSON,
Chief Engineer,
Department of Natural Resources,
Canadian Pacific Railway.
Calgary, Alta., March 1, 1912. 9-12

CITY OF TORONTO

Main Drainage Works

Sealed tenders addressed to the Chairman of the Board of Control, City Hall, will be received by registered post only. up to noon of **Tuesday, March 26th, 1912,** for the supply of Electrical Equipment for Pumping Station, Sewage Disposal Works.

The equipment includes:

One 200 horse-power vertical motor;
Two 75 horse-power vertical motors.
One 9-panel switchboard.

Plans, specifications, forms of tender and other information may be obtained at the office of the City Engineer, Toronto, Ont.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman Board of Control.
10-12

City of Moose Jaw, Sask.

TENDERS

For Sewer and Water Extensions

Sealed tenders marked "Tenders for Sewer and Water Extensions," addressed to the City Commissioners, Moose Jaw, will be received up to noon of **Monday, March 29th, 1912,** for the installation of approximately three miles of 8 and 10-inch sewer mains and 6-inch water mains.

Plans, specifications and any further information may be obtained from J. Antonisen, City Engineer.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT, City Commissioners.
W. F. HEAL,
Moose Jaw, Sask., March 12, 1912. 11-12

CITY OF SASKATOON

TENDER

For Sandstone Block Pavement

Sealed tenders, addressed to the City Commissioners, and endorsed "Tender for Sandstone Block Pavement," will be received up to twelve o'clock noon on **Friday, April 5th, 1912,** for the laying of approximately 23,100 square yards of Sandstone Block Pavement.

The Corporation reserves the right to reject any or all tenders.

All information may be obtained on application to George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, March 2nd, 1912. 12-13

THE GOVERNMENT OF
THE PROVINCE OF BRITISH COLUMBIA.

To Canadian Architects

Competition for New University Buildings to be erected at Point Grey, near Vancouver, British Columbia

The Government of British Columbia invite Competitive Plans for the general scheme and design for the proposed new University, together with more detailed Plans for the buildings to be erected first at an estimated cost of $1,500,000.

Prizes of $10,000 will be given for the most successful Designs submitted.

Particulars of the competition and plan of site may be obtained on request from the undersigned.

The designs to be sent in by July 31st, 1912, addressed to

THE MINISTER OF EDUCATION,
Parliament Buildings,
Victoria, British Columbia.
10-15

Canadian Pacific Railway Company

Department of Natural Resources
Irrigation Branch

Tenders for Steel Highway Bridges

Sealed tenders, addressed to the undersigned, will be received up to noon of **April 15th, 1912,** for the design, manufacture and erection complete on piers to be provided by the Railway Company, of the following Steel Highway Bridges:—

Two Bridges, span 125 feet.
Four Bridges, span 100 feet.
Fourteen Bridges, span 75 feet.
Nine Bridges, span 60 feet.

Contract, specification, form of tender and general instructions may be had on application to the undersigned. A deposit of $25.00 will be required before specifications will be given out, which will be returned on receipt of a bona fide tender.

Tenders will only be received from parties who can show a reasonable acquaintance with work of the required character, and that they have the facilities and plant necessary for work of such magnitude.

A certified cheque or cash deposit to the amount of five per cent. of the tender must accompany all bids as a guarantee that the bidder will enter into a contract for the work should it be awarded to him, and which will be forfeited as liquidated damages should the bidder default.

Cheques or deposits of the unsuccessful bidders will be returned within ten days after the award of the contract.

The right is reserved to the Company to reject any or all tenders and to waive defects.

A. S. DAWSON,
Chief Engineer.
Calgary, Alta., March 1, 1912. 11-14

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. Chicago, Ill.

CITY OF TORONTO

Main Drainage Works

Sealed tenders, addressed to the Chairman of the Board of Control, City Hall, will be received by registered post only, up to noon of Tuesday, **March 26th, 1912**, for the construction of Section No. 15 (Rosedale Creek Syphon) High Level Interceptor. The work covers the laying of 5,700 lineal feet of 42-inch reinforced concrete pressure pipe.

Plans, specifications, forms of tender and other information may be obtained at the office of the City Engineer, Toronto, Ont.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
11-12 Chairman, Board of Control

City of Moose Jaw, Sask.

Tenders for Fire Hose

Sealed tenders marked "Tenders for Fire Hose," addressed to the City Commissioners, Moose Jaw, will be received up to noon of **Monday, March 25th, 1912**, for the supply and delivery of 500 feet 2½-inch, 3-ply cotton, rubber-lined fire hose. Parties tendering must also submit samples.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT, City Commissioners.
W. F. HEAL,
Moose Jaw, March 4th, 1912. 11-12

CITY OF PORT ARTHUR

Notice

Sealed separate tenders, endorsed on envelope. "Tender for Paving," will be received by the undersigned up to 6 o'clock p.m. of Monday, **April 8th, 1912**, for paving the following streets:

Pearl street from Water to Court, curb and gutter, 1,836 lin. ft.; pavement in sq. yds., 4,360.

Bay street from Cumberland to Algoma, curb and gutter, 2,930 lin. ft.; pavement in sq. yds., 4,784; track laying, 3,250 sq. yards.

Algoma street from Bay to Queen, curb and gutter, 4,000 lin. ft.; pavement in sq. yards, 5,785; track laying, 4,340.

Totals, curb and gutter, 8,766; pavement in sq. yds., 14,929; track laying, 7,590 sq. yards.

Tenders will be received for Sheet Asphalt, Asphalt Block and Bitulithic.

Further instructions as to specifications and forms of tender may be obtained from L. M. Jones, City Engineer, Port Arthur.

A marked cheque for ten per cent. of the estimated amount of contract must accompany each tender.

The lowest or any tender not necessarily accepted.

J. McTEIGUE, City Clerk.
Corporation Offices, Port Arthur.
March 9th, 1912. 11-14

Special Notice to Contractors

Could supply you with any quantity of relaying rails or for reinforcing concrete at a very low price, B. Shragge Iron & Metal Company, 396 Princess street, Corner King; Telephone St. John 373, Winnipeg. 11-23

TENDERS

Bulk and separate tenders will be received by Mr. J. Wall, General Manager of British Canadian Canners, Limited, Lister Block, Hamilton, Ont., for the several works required in the execution of canning factories, warehouses, etc., at Cobourg, Bowmanville, Port Robinson, Berlin and Highgate, Ont. Tenders close at noon, **Saturday, March 23, 1912.** Plans and specifications may be seen on and after the 12th inst. at the residence of the local manager at above places, at the company's offices at Hamilton, and at the offices of Munro & Mead, arcnitects, Chancery Chambers, Hamilton.

The lowest or any tender not necessarily accepted. 11-12

CITY OF LETHBRIDGE

Grading Sanitary Sewers Cement Walks, Curb and Gutter

Sealed tenders addressed to the Secretary-Treasurer of the City of Lethbridge and endorsed "Tender for Grading," etc., as the case may be, will be received by registered post only up to noon of **Thursday, April 11, 1912.**

Approximately 2½ miles of Sanitary Sewers.

Approximately 3½ miles of Cement Walks, (Curb and Gutter in addition).

Approximately 7 miles of Grading.

A deposit in the amount of $500 must accompany any tender on each contract. A bond in the amount of $8,000 will be required of successful bidder. The lowest or any tender not necessarily accepted.

Plans and specifications can be obtained from the City Engineer and are also on file at the office of this journal, Commercial Travellers' Building, Winnipeg.

A. C. D. BLANCHARD, City Engineer.
G. W. ROBINSON, Serretary-Treasurer.
11-12

COUNTY OF HALDIMAND

Tenders For Road Machinery

Tenders are invited by the Corporation of the County of Haldimand for furnishing one Steam Road Roller, one Rock Crusher outfit, three Graders, one Rooter, six Spreader Wagons, one Sprinkling Tank, one Traction Engine, one Rock Drill and thirty-six Steel Levellers on the principle of the split log drag.

Blank forms of Tender and complete information may be obtained by applying by letter to Alan Mair Jackson, County Engineer, Dunnville, Ont.

Sealed tenders, which must be made on the prescribed form, will be received up to six p.m. on **Monday, March 25th, 1912**, by registered letter, plainly marked on the outside of the envelope, "Tenders for Road Machinery," and addressed to the undersigned.

Tenders will be opened in Committee Meeting and if approved will be recommended to the County Council for acceptance.

The lowest or any tender not necessarily accepted.

W. D. ROULSTON,
Chairman County Road Committee,
Garnet, Ont.,
11-12 Haldimand County.

Tenders For Church

Tenders will be received until **April 10, 1912**, for construction of St. Margaret's Church, Midland, according to plans and specifications which may be seen at the office of architect, J. W. Siddall, Janes Building, 75 Yonge street, Toronto or at Midland.

Tender will be required as follows:—

1. For completion of church.
2. For construction of stone work and erection of roof.
3. For construction of stone work only.

Stone is already on the ground and will not be included in tender. For further information, apply to F. P. Potvin, Midland, Secretary Building Committee. 12-13

Corporation of the City of Westmount

CITY SURVEYOR'S DEPARTMENT

Tenders are invited for the construction of the following works:—

A. Contract No. 13—Intercepting sewer, Western avenue.

B. Contract No. 12—Paving of Western ave.

Drawings, general conditions, specifications, schedule and form of tender can be seen at the City Surveyor's office on and after 13th March, 1912.

Copies of drawings, general conditions, specifications, schedule and form of tender can be obtained on payment of fifteen dollars for each contract, which will be refunded on receipt of a bona fide tender and return of the aforesaid documents.

Sealed tenders marked with the respective contract numbers are to be deposited with the City Clerk, City Hall, Westmount, not later than twelve noon, 28th March, 1912.

Tenders will be opened by the Mayor sitting in public at 5 p.m., March 28th, 1912.

The Council does not bind itself to accept the lowest or any tender.

ARCH. CURRIE, C. E.,
12-13 City Surveyor.

CITY OF REGINA

Province of Saskatchewan

Sealed tenders addressed to the City Commissioners, Regina, will be received until noon on **Monday, March 28th, 1912**, for the construction of:

7272 lin. ft. 45-in. reinforced concrete sewer pipe.
3155 lin. ft. 42-in. reinforced concrete sewer pipe.
2777 lin. ft. 40-in. reinforced concrete sewer pipe.

Earthwork

The excavation of a trench for and the laying therein of a reinforced concrete sewer pipe from:

(1st) The intersection of Campbell street and Seventh avenue to the intersection of Edward street and Fourteenth avenue, a distance of about 7272 lineal feet, and

(2nd) Edward street and Fourteenth avenue to a point on Nineteenth avenue east of Angus street, a distance of about 5932 lineal feet.

Sewage Disposal Work

Two Filter Beds.
One Stand-bye Tank.
Pipe lines connecting the various parts of the Works.

Concrete blocks for false floors in Filter Beds.
Steel Roofs for Filter Beds.

Tenders for the whole or any part of the above works will be considered.

The City reserves the right to reject any or all bids, and to waive any irregularities therein.

Copies of Plans, Specifications, Schedules and form of Tender and full information may be had from the undersigned.

J. M. MacKAY, Chief Engineer.
Trunk Sewer Works
Regina, March 4th, 1912. 11 13

TENDERS

Tenders will be received up to and including Saturday, the **30th** day of **March, 1912**, for the construction of Reinforced Concrete Approaches to the East Branch Bridge of the River Sydenham at Wallaceburg.

Plans and specifications may be seen at the office of the Contract Record, Toronto, or at the Clerk's Office, Wallaceburg.

The lowest or any tender not necessarily accepted.

H. E. JOHNSON, Town Clerk,
Wallaceburg, Ont.

12-13

Machinery For Sale

1—70-ton Style C Bucyrus Shovel.
4—18-ton Porter Dinkies, 36-in. gauge.
1—12-ton Porter Dinkie, 36-in. gauge.
50—4 cu. yd. two-way Dump Cars.
1—80 h.p. Boiler on Skids.
1—30 h.p. Marine Type Boiler.
1—Air Compressor and Tank.
80—G. T. 56 lb. Relaying Rails.

All in first class order for immediate shipment.

FRASER, BRACE & COMPANY,
P. O. Box 121,
Valleyfield, P. Q.

12-15

CITY OF MOOSE JAW,

SASKATCHEWAN

Tenders For Steam Plant

Sealed tenders marked "Tenders for Steam Plant," addressed to the City Commissioners, Moose Jaw, will be received up to **10 a.m.** of **Wednesday, April 17th, 1912**, for contract **"D"** consisting of:—

Section 1. Water-tube boilers and accessories.
Section 2. Mechanical draft equipment.
Section 3. Fuel economizer.
Section 4. Coal and ash handling equipment.

Specifications and all information may be obtained on application to J. D. Peters, Electrical Superintendent, Moose Jaw.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.

Moose Jaw, Sask.,
March 12th, 1912.

12-14

Municipal Debentures For Sale

Town of Gleichen, Alberta

Tenders for the purchase of the following debentures will be received by the undersigned up to the Fourth day of April, 1912, at 6 o'clock p.m.

1. Five Thousand Dollars of 6 per cent. debentures, 20 years, annual installment, $435.92 in each year, issued by the Municipality of the Town of Gleichen for the purpose of completing the Water and Sewerage Works of the said Town.

2. Four Thousand Dollars of six per cent. debentures, 20 years, annual installment, $348.73 in each year, issued by the above-mentioned Municipality for the purpose of grading the streets of the said Town.

The Corporation of the Town of Gleichen do not bind themselves to accept the lowest, or any tender.

For further particulars apply to the undersigned.

W. J. BURR, Secretary-Treas.,
Town of Gleichen, Alberta.

12-13

Stone Wanted

Tenders addressed to the undersigned and marked "Tender for Stone," will be received up till noon on the **2nd** day of **April, 1912**, for the following stone for building roads under the County Good Roads system:—

Crushed stone, per ton, and rubble stone per cord; f.o.b. cars and quarry, and delivered in car lots at different points of County of Welland.

(Signed) ROBERT COOPER,
County Clerk,
Welland, Ont.

12-13

Tenders Wanted

Tenders wanted on all trades except steel work for a new warehouse and shipping building at Peterboro for The Canadian General Electric Company.

Plans and specifications can be seen at the works at Peterboro or at the offices of the Architects, G. M. Miller & Company, 59 Yonge street, Toronto.

Tenders must be in by 12 o'clock noon on the 1st of April, 1912.

The lowest or any tender not necessarily accepted.

12

Engineer and Superintendent Wanted

Applications addressed to the undersigned will be received up till twelve o'clock noon on the **2nd** day of **April, 1912**, for the positions of County Engineer and County Road Superintendent for the County of Welland. Applicants are to state their experience, qualifications, and the salary or remuneration required. The services of the engineer will be for part time only.

All applications are to be in writing, and to be endorsed "Application for Position."

Any applicant personally canvassing a member of the County Council or county official will be disqualified for appointment.

(Signed) ROBERT COOPER,
County Clerk,
Welland, Ont.

12-13

Road Machinery Wanted

Tenders addressed to the undersigned will be received up till twelve o'clock noon, on the **2nd** day of **April, 1912**, for the following machinery for the use of the corporation of the County of Welland, for use on county roads, as follows:

Two steam road rollers, of about ten tons weight each.
Two portable rock crushers, having a capacity of about ten tons per hour.
Two portable bins for storage of stone, having about twenty-five tons capacity.
Two revolving screens and two chain elevators.
Rollers and crushers are to be fully equipped with all minor implements and attachments.
Two large road graders.
Two sprinkling wagons.
One traction engine of 18 h.p., adapted to hauling of wagon trains.
Two pick plows.
Two wheeled scrapers.

Any firm or dealers who personally or through their agents canvass members of the County Council or officials of the county will be disqualified from having their tenders accepted.

(Signed) ROBERT COOPER,
County Clerk,
Welland, Ont.

12-13

Situations Wanted

Civil Engineer

Civil Engineer, experienced on railroad engineering and hydro-electric development in Western Canada, at present employed, desires engagement in responsible position with successful contractor. Reply Box 466, Contract Record, Toronto, Ont.

Port Stanley Waterworks

To Contractors

Sealed tenders addressed to the undersigned will be received until noon on **Friday, the 29th** inst., for the following:

1st, Erecting steel stand pipe;
2nd, Concrete foundation for same;
3rd, Supplying cast-iron pipe and castings;
4th, Supplying valves and hydrants.

For further particulars address

JAS. A. BELL & SON.
Civil Engineers St. Thomas, Ont.

12-13

BOARD OF EDUCATION

TORONTO

Tenders Wanted

Sealed tenders, addressed to the Secretary-Treasurer of the Board, will be received until **Friday noon, March 29, 1912**, for

A new school building on Manning avenue;
A new school building on Morley avenue;
Vacuum cleaning apparatus complete for five schools;
Manual training fittings at Brown's School.

Specifications may be seen and all information obtained at the office of the Superintendent of Buildings, City Hall. Each tender must be accompanied with an accepted bank cheque for five per cent. of the amount of tender or its equivalent in cash. Tenders must be in the hands of the secretary-treasurer at his office in the City Hall not later than 12 o'clock noon on the said day, after which no tender will be received.

The lowest or any tender will not necessarily be accepted.

W. C. WILKINSON,
Secretary-Treasurer.
W. W. HODGSON,
Chairman of Committee.
Toronto, Ont.

45-45

Situations Vacant

Advertisements under this heading two cents a word per insertion. Box No. ten cents extra. Minimum charge 25 cents

Salesman Wanted

To handle as a side line an Anti-Corrosive and Waterproof Paint for all kinds of structural steel and bridge work, concrete work and shipbuilding. Manufactured in England. Only a first class man wanted. Address Box 460, Contract Record. 11-12

Draughtsman Wanted

WANTED—First class engineering draughtsman, able to design reinforced concrete work. Apply E. J. H., B34 Board of Trade Building, Montreal, Que. 12

Architectural Draughtsman Wanted

WANTED—Architectural Draughtsman for manufacturer's office; must have at least five years experience in an architect's office. Permanent position with good salary and prospects. Preference will be given to a graduate of the School of Practical Science. State age, references and experience. Apply Box 465, Contract Record, Toronto, Ont. 12

Business Buildings and Industrial Plants

(Continued from page 69)

chase east side of Wellington street from Bank street to Perley Institute and to erect Departmental Buildings on this site in the near future.

Prince Albert, Sask.
Marion Bros. are contemplating the erection of an hotel, cost $40,000. Architect, A. Albrechsen, Prince Albert. Four storeys, brick, stone and steel, steam heating, electric light, gravel roof fire escapes, telephone, boilers.

Regina, Sask.
A site has been secured for warehouse for Regina Trading Company. President, J. F. Bole, M.L.A. Building will be erected this summer.

Thetford Mines, Que.
The Jacobs Asbestos Company will build new mill and will require in addition to the building, motors, rope, hoists, mining supplies and equipment.

Thorold, Ont.
E. Clendennan, Niagara Falls, Ont., is contemplating the erection of a planing mill here.

Toronto, Ont.
Plans are in progress for stores and offices to cost $10,000, 163 Yonge street, for L. J. Cosgrave, 565 Jarvis street. Architect, J. W. Siddall, 75 Yonge street; 4-sty., brick, concrete footings, freight elevators.

Vancouver, B.C.
Parr, McKenzie & Day, 570 Granville street, are preparing plans for a 9-sty. steel, frame, brick and terra cotta office building 25 x 120 feet to be erected in the Zoo block on Granville street. Cost $100,000.

Walkerton, Ont.
The council will submit a by-law to the ratepayers shortly in regard to loaning The Canada Saddlers Hardware & Steel Goods Co. a free site and tax exemption on condition that a new factory be built. Messrs. Shaw and Martyn, of St. Catharines, are the heads of the new concern and there is every prospect of the by-law carrying by a large majority.

Weyburn, Sask.
H. Geaser, 515 McIntyre Block, Winnipeg, is planning to erect an office block here.

W. B. Proctor & Company, 42 Victoria street, Toronto. plan an office block here and are asking information on brick, concrete and cut and manufactured stone.

Canadian Town and City Property Company, Winnipeg, Man., plan to erect a two-storey business block on Souris avenue, 90 x 120.

Wiarton, Ont.
J. H. Fielding & Son plan to rebuild store and office on Berford street. -sty., 60 x 90, brick, stone, hot water heating, gravel roofing, electric lighting, walls and foundation left standing from fire of last month. Work will start in spring. Cost $9,000.

Winnipeg, Man.
Tenders are called for printing offices for Farmers' Advocate Publishing Co. of Winnipeg, Limited. Architect, A. E. Matthews, Bank of Nova Scotia Bldg., Winnipeg. Brick and stone, concrete foundation, steam heating, electric lighting, tar and gravel roofing, interior finish fir. Received by architect until March 21st.

CONTRACTS AWARDED

Calgary, Alta.
A permit has been granted for warehouse to cost $35,000, 11th avenue, for L. M. Roberts, c/o Lougheed & Bennett. General contractor, G. J. Doris, Parkview, Calgary. 3-sty., 50 x 120, brick, mill construction, concrete foundation, steam heating, electric light, tar

Steel contract is awarded for stores and offices, 8th avenue, for Mr. Mackie. Architect, J. Teague, 312 Dominion Bk. Bldg., Calgary. Steel work, Dominion Bridge Co., Winnipeg. Other contracts not yet awarded. 10-sty., fireproof, brick, stone and steel construction. Electric lighting, steam heating.

Chatham, Ont.
Contracts are awarded for remodelling office of Chatham Gas. & Electric Light Company. Architect, J. L. Wilson & Son, Chatham. General contractor, H. Rayment. Iron work, Moore & Stephens; painting, Wm. D. Palmer, all of Chatham. Plumbing and heating not let yet.

Guelph, Ont.
The G. E. B. Grinyer Company have been awarded the contract at $5,000 for heating and wiring the new building of the Independent Tire Company. The firm also has the contract for wiring the new Herald Building.

Hamilton, Ont.
Addition to factory to cost $10,000, King William street, for Canada Wire Goods Co., 182 King William street, Hamilton. President, William Holmes. Contractor, George E. Mills, 614 King street east, Hamilton. Addition of one storey, new paint tower and general improvements.

Store and apartments for A. J. Wright, hardware merchant, 205 James street N. Architect, Rastrick & Sons. Masonry and brick contractors, Howard & Webber, Barton and Catherine street, Hamilton. Owner will supervise work.

Ottawa, Ont.
Addition to warehouse, cost $3,800, for Wm. Gray & Sons, Limited, 282 Sparks street, Ottawa. General contractor, R. Bingham, 22 Baird street, Ottawa. Brick veneer and iron clad. Replacing pitch roof by tar and gravel roofing.

Garage, cost $17,000, on Luke street, for Victoria Garage Company, of Ottawa. Contractor, Chas. Hollbrook, 425 Somerset street, Ottawa. Solid brick, 56 x 179, electric light.

Quebec, Que.
The contract for white matt glazed terra cotta for the new building for the Dominion Fish & Fruit Company has been awarded to W. Beverley Robinson & Company, Board of Tarde Building, Montreal, agents for Doulton & Company's "Carrara."

Garage to cost $10,000, St. Valier, for P. T. Legare Co., St. Paul street, Quebec. General contractor, M. Cauchon, St. Roch, Que 2-sty., 175 x 43, concrete foundation, hot water heating, metal roofing, electric lighting. Garage to be used as storage and repair shop.

Toronto, Ont.
Office to cost $4,000, on Don Esplanade, for Conduits Ltd., Don Esplanade. Architect, Bond & Smith, 192 Wellington west. Builder, Elgie & Page, 47 Havelock street. 1-sty., brick and frame, tar and gravel roof.

Addition to warehouse to cost $5,000, S. side Adelaide street near Bay, for Jas. Morrison Brass Mfg., Adelaide West. Builder, E. Gearing, 102 Carleton street. Brick in cement mortar, concrete footings.

Pair stores and dwellings to cost $5,000, Arthur street, for J. Rumm, Spadina and Baldwin street. Architect, W. C. Mason, 358 Montrose avenue. Builder, R. B. Burkell, 186 Rusholme road. Two-storey, brick, stone foundation, tar and gravel roof.

Power Plants, Electricity and Telephones

Acton, Ont.
The by-law carried to provide for a power station to cost $8,500. Clerk, A. J. McKinnon.

Ottawa, Ont.
An order in Council signed by Hon. Adam Beck, chairman of Commission, for expropriation of islands at Chats Falls, together with plans and specifications has been filed at the County Registry Office. Owner, Hydro Electric Power Commission of Ontario. Engineer, P. W. Southam, Continental Life Bldg., Toronto.

Plans are being prepared by City Engineer Ker for alternate schemes—"Central Trolley & Lighting System," Ornamental C.I. Pillars for trolley wire and sidewalk lighting. Central System of C. I. pillars are 20 ft. high. Sidewalk System of C.I. pillars are 18 ft. high. Central System has three lights. Sidewalk has four lights. The street railway will be extended along Wellington about 3,000 lin. feet.

Rossland, B.C.
The following engineers are preparing estimate of cost of electrification, Canadian Pacific Railway, Rossland to Castlegar. A. H. Armstrong, c/o General Electric Co. Schenectady: H. D. Bayne, Canadian General Electric, Toronto; L. A. Campbell & J. D. McDonald, of West Kootenay Power & Light Co., Rossland, B.C. Superintendent, Miller. Engineer, Moss.

Thorndale, Ont.
A by-law will be voted on shortly to provide hydro electric lighting and power. Interested, Mr. Shaw, of Ontario Hydro Electric Commission.

Toronto, Ont.
Sealed tenders received till noon, Mar. 26th, for electrical equipment for pumping station at sewage disposal works; one 200-h.p. vertical motor; two 76-h.p. vertical motors and one 9-panel switchboard. Plans with City Engineer.

Winnipeg, Man.
Contract is awarded to Imperial Wire & Cable Co., Montreal, for supply of 25,000 lbs. No. 8 weather-proof wire, $4,137.50.

Miscellaneous

Amherstburg, Ont.

Tenders are called for residence, cost $7,500, for Dr. James Jarmen. Architects, Jacques & Company, Windsor. One and a half storey, 40 x 46, brick and stucco, stone foundation, hot water heating, electric lighting, shingle roofing, oak, cypress and pine interior finish.

Brandon, Man.

Architects Shillinglaw & Marshall have prepared plans for the erection of a new house for H. Maley, and tenders will be called shortly.

Plans have been prepared for an 8-room Normal School for Department of Public Works, Winnipeg. Provincial Architect, V. W. Horwood, Winnipeg. Work will commence this year.

Calgary, Alta.

The Canadian Pacific Irrigation & Colonization Company propose to build a big wing dam to raise water ten feet above present level and thus provide more effective irrigation.

Grand Valley, Ont.

A site is being cleared for erection of a public library on Main street. Chairman Library Board, J. J. Keith; architect, Mr. Grey, Mount Forest. Plans with chairman. Tenders asked for in part or whole.

Halifax, N.S.

The City Fire Department has asked the City Council to increase appropriation to $11,500. If granted Department will be in the market for motor fire apparatus. Offer made by local agent of a United States firm to supply for $11,200 a (U. S.) motor propelled, including a pump (gasoline) of 600 gallons per minute capacity, and a chemical engine (35 gallons), carrying beside chemical engine hose, 1,000 feet of fire hose (2½-in.) and ten men.

Hamilton, Ont.

W. D. Flatt, Federal Life Bldg., is planning to erect four houses east of Burlington to cost $16,000.

The Board of Control, Chairman, Mayor Geo. H. Lees, will shortly call for tenders for wiring all fire stations and other municipal buildings.

It is proposed to erect 151 dwellings, 35 near John and Brock streets; 80 in Orchard Hill Survey; 15 on St. Clair, Westmoreland and Eastbourne avenues; 25 bungalows at Kenmore Park. Prices range from $1,000 to $5,000. Builders, Bennett & Thwaites, 14 Holden ave.

A permit has been granted for carriage factory, cost $6,000, for Andrew Ross, King street east. Contractor, Geo. E. Mills, 614 King street east, Hamilton. One storey, brick.

The contract is awarded for new Cathedral School to Contractor W. H. Cooper, Robert and Emerald streets. Owner, Separate School Board. Architect, L. A. Wardell, Bay and Hunter streets, Hamilton.

Contract is awarded for fifty cement houses in East End, to Joseph Stein, Beach Road. Bennett & Thwaites, 14 Holden avenue, are interested in the scheme.

London, Ont.

Watt & Blackwell are the architects for the new Grand Building here. The report that H. C. McBride had prepared plans was an error. Tenders will be called about March 28th.

Montreal, Que.

Bowling alley, Town Hall. Architect, Peden & McLaren, 20 Alexis street, General contractor, Reid, McGregor & Reid, 14 Guy street. Plumbing, Dominion Camp Equipment Company, 97 Shannon street; furnishings, Brunswick-Balke-Collender Company, 11 Notre Dame street west, Montreal.

Moose Jaw, Sask.

City Commissioners, A. W. Maybury, L. W. Rundlett and W. F. Heal. Tenders will be received by Commissioners until March 25th, 1912, for supply of 500 ft. 2½-in. 3-ply cotton, rubber lined fire hose.

Ottawa, Ont.

The following tenders on motor fire engine were received: General Supply Co., The Lafrance, motor-driven, 750 gals., $13,800, horse-driven, rubber tires, 6,000. Hugh Cameron & Co., Toronto, Waterous, 800 gals., rubber tire, steam fire engine, $5,800; steel tires, 5,300. Seagrave Co., horse power tractor, $6,875, or $11,675 for a combination B. H. Baldwin for Nott motor propelled steam fire engine, 900 gals., $7,420.

Shop additions, cost $4,000, Queen street, for A. G. Acres, agent, Bank St. General contractor, Johnston L. White, Ottawa. Shop fixtures will be required.

Shops & dw., cost $3,800, Preston St., for F. N. Amey & J. S. Polson, Ottawa. Architect, J. P. McLaren, 104 Sparks street, Ottawa. General contractor, S. J. Hunt, 131 Spadina avenue, Ottawa. Brick veneer and solid brick.

McDougall Limited has been awarded contract for 1912 supply of waterworks valves, cost $4,659.

Quebec, Que.

It is stated that the National Hockey Association, President, T. Emmett Quinn, 2 Place d'Armes, Montreal, are arranging for the erection of a new Hockey Arena. $35,000 is already on hand.

Regina, Sask.

Plans have been prepared for G.T.P. station, cost $200,000. Div. Supt., W. B. Cronk, Regina. Plans with General Passenger Agent Hinton, Winnipeg. Site not announced yet.

Armstrong, Smyth & Dowswell, retail and wholesale hardware, Scarth street, plan to erect a new warehouse this summer.

St. Mary's, Ont.

It is stated that plans will be prepared for Charles Whelehan shortly for a new brick business block to replace the one destroyed by fire recently.

Toronto, Ont.

A permit has been granted for residence, cost $3,200, on Avenue road, for A. Wright, Avenue Road. Architect, G. V. Burgess, 105 Balmoral avenue. Two storeys and basement.

Plans are in progress for pair of residences, cost $9,000, Dupont and Shaw streets, for J. E. Squirrell, 115 Elm St. Architect, W. H. Ratcliffe, 2188 Gerrard street east. Tar and gravel roof.

The contract for porous terra cotta fireproofing of the Fern Avenue School have been awarded by the Board of Education to Robert Bennett, contractor, Kingston road.

Tenders are open for detached house, cost $3,500, Palmerston ave., for Caplan Bros. & Layvesky, 237 Augusta avenue, Toronto. Architect, J. G. Hedges, 86 Clinton street, Toronto. Two storeys and attic, brick, stone foundation, slate roofing.

Welland, Ont.

Public School Board are planning to erect a new school on Lincoln street to cost $26,000. G. R. Boyd, clerk.

Windsor, Ont.

Plans are being prepared for residence, cost $12,000, Ouellette avenue, for W. L. Kennedy, President Windsor Gas Company. Architects, Jacques & Company. Two storeys, 40 x 43, brick, brick foundation, hot water heating, electric lighting, shingle roofing, oak, mahogany, maple and birch interior finish.

Winnipeg, Man.

Plans are being prepared for warehouse on James street, for Matthews, Lang & Company, Limited, meat packers, Tees & Persse Bldg., Winnipeg.

Business Notes

Guelph, Ont.

Fire almost completely gutted the City Hotel. Total loss $53,000, which includes $30,000 on carpets stored by Guelph Carpet Co. Jas. Bolger, prop.; L. Singular, owner.

Ottawa, Ont.

On 13th inst. fire damaged residence of Jas. Chenier, 2nd street, Mechanicsville, to extent of $4,000.

Peterboro, Ont.

R. Wilson, of Peterboro Machine Co., it is stated, has purchased plant, etc., of the Peterborough Lubrication Mfg. Co.; also that plans are being prepared for new factory for the increased business. A garage will be built for storage and repair work.

New Companies

J. T. Wing & Company, Limited, have been incorporated with a capital of $40,000 to manufacture and deal in all kinds of plumbing and building supplies, with head office at Windsor, Ont. The provisional directors are J. T. Wing, N. S. Boyes, of Detroit, Mich., and J. R. Milner, of Chatham, Ont.

The Balmoral Land and Development Company, Limited, has been incorporated with a capital of $200,000 to carry on business as a land and building company with head office at Toronto. The provisional directors are F. H. White, G. Tyrrell and H. J. Wood, all of Toronto.

Home City Estates, Limited, have been incorporated with a capital of $600,000 to carry on business as a general land and building company with head office at Toronto. The provisional directors are H. G. Buckland, C. M Johnston and G. R. Kappele, all of Toronto.

The Port Dover Brick and Tile Co. Limited, has been incorporated with a capital of $60,000 to manufacture and deal in brick, building blocks, tile and other supplies, with head office at Port Dover. The provisional directors are H. W. Ansley, C. W. Barwell and E. P Bagley, all of Port Dover.

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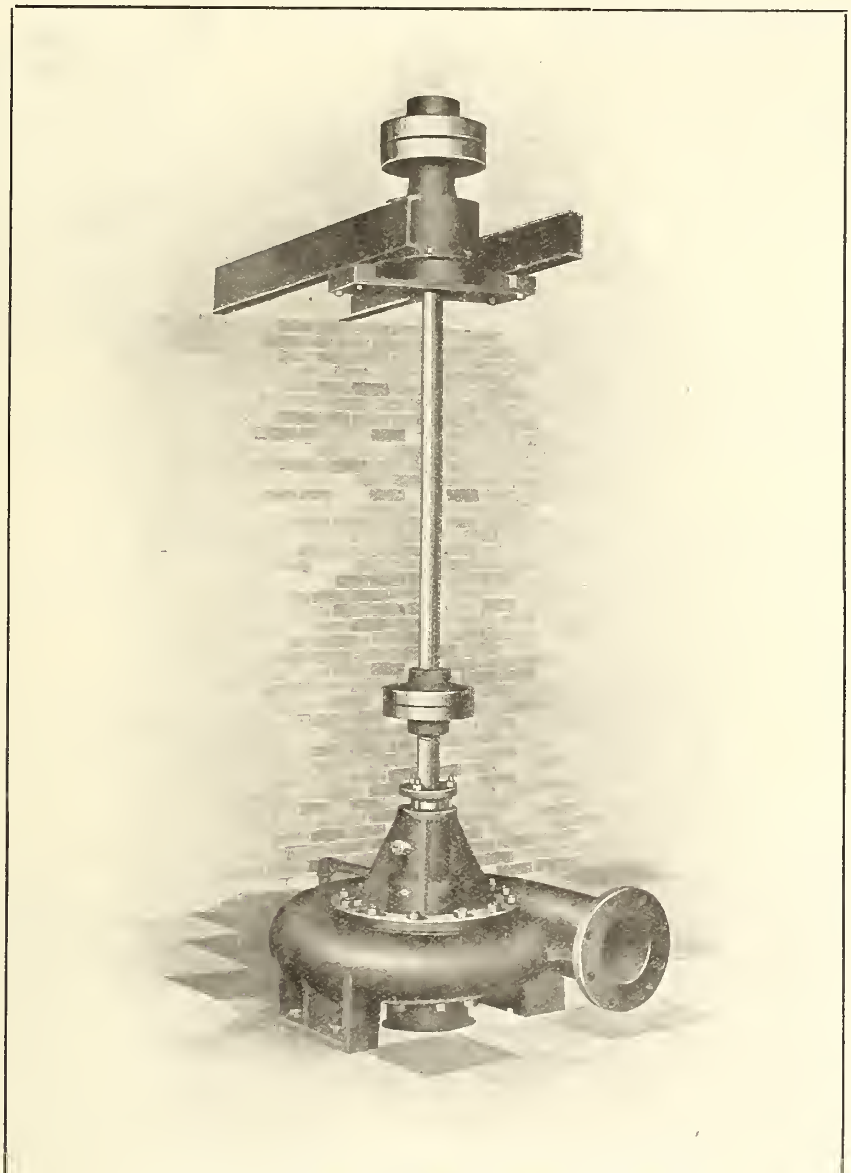

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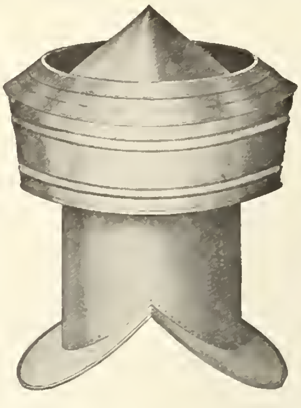

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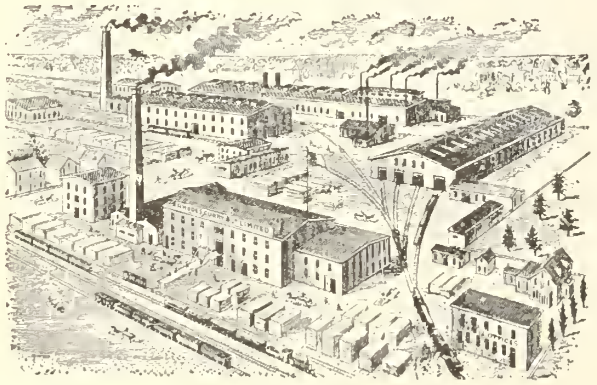

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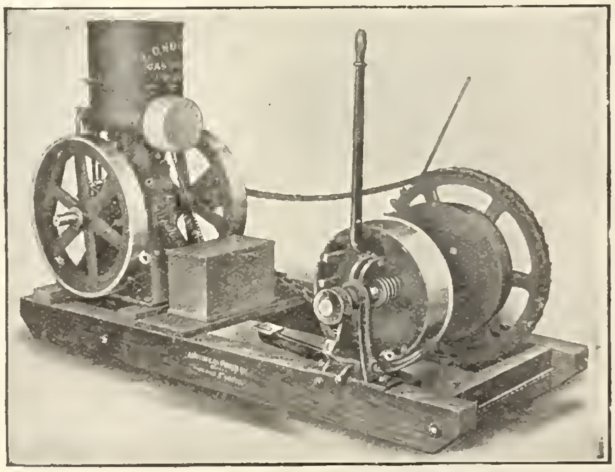

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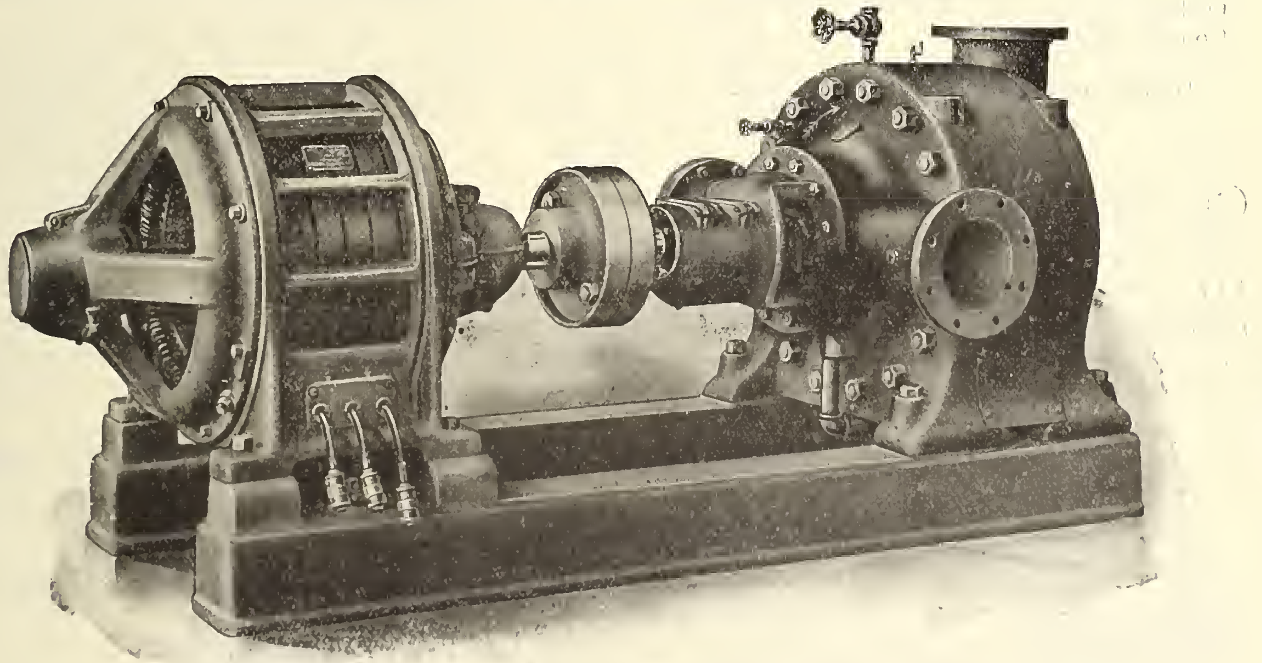

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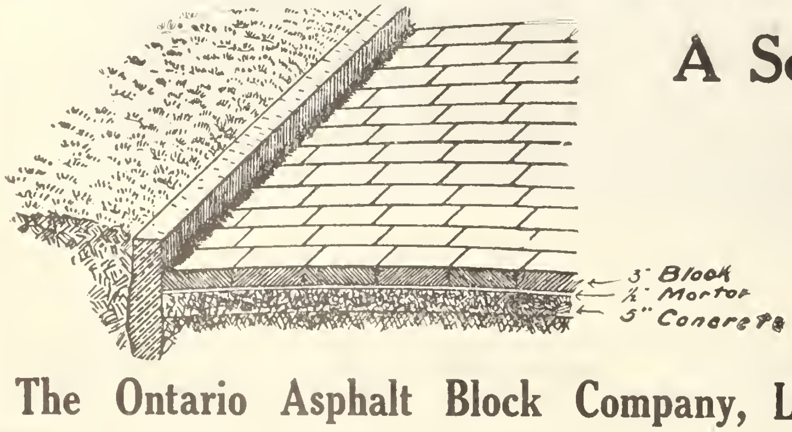

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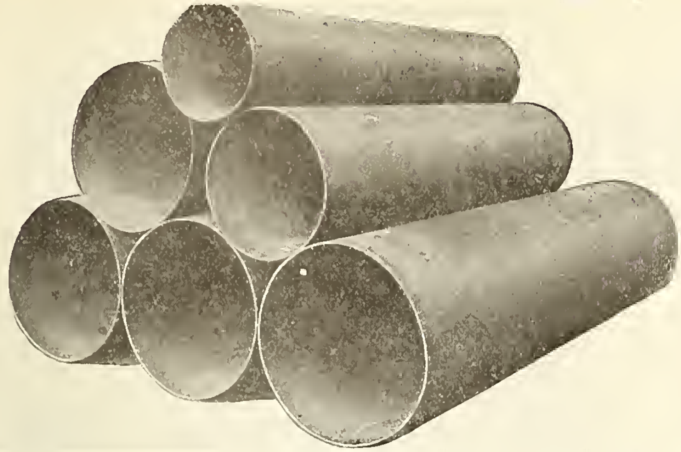

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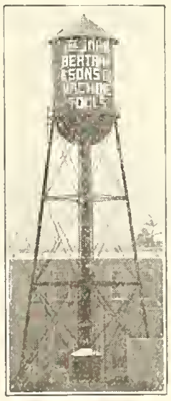

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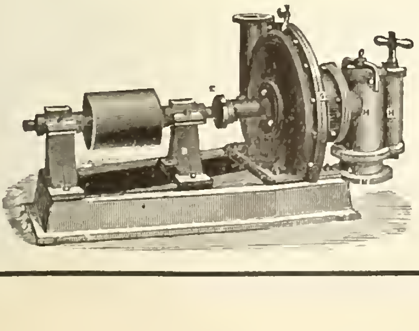

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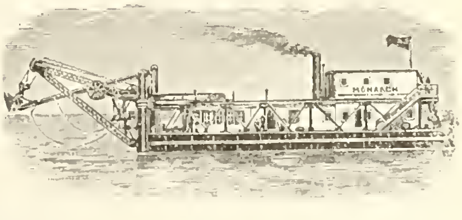

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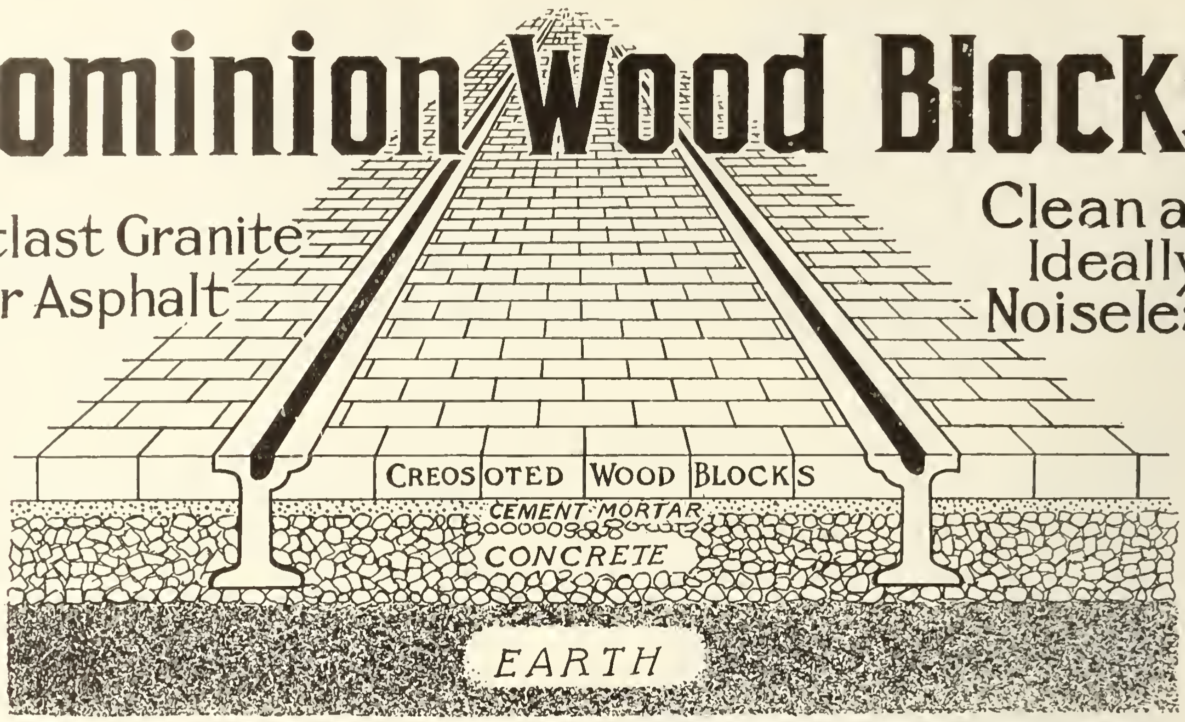

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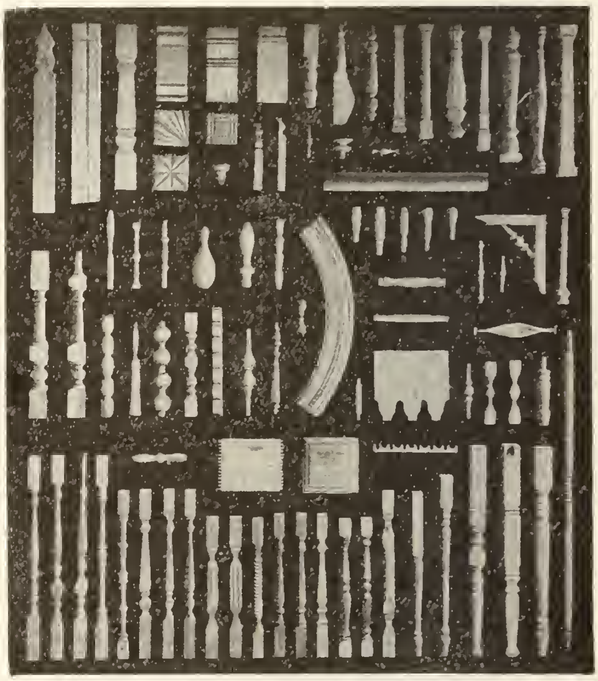

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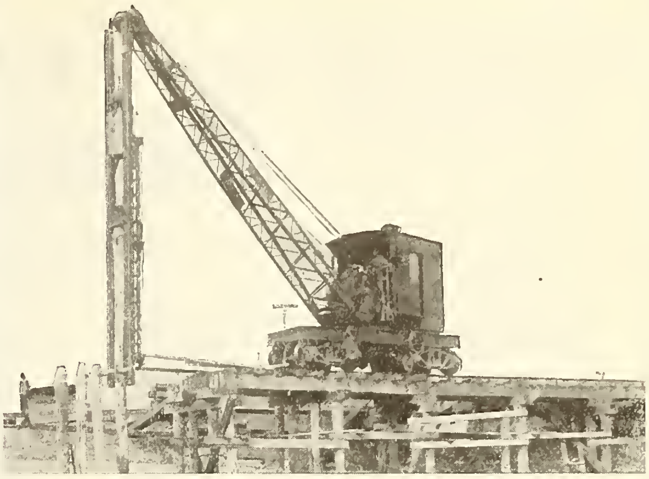

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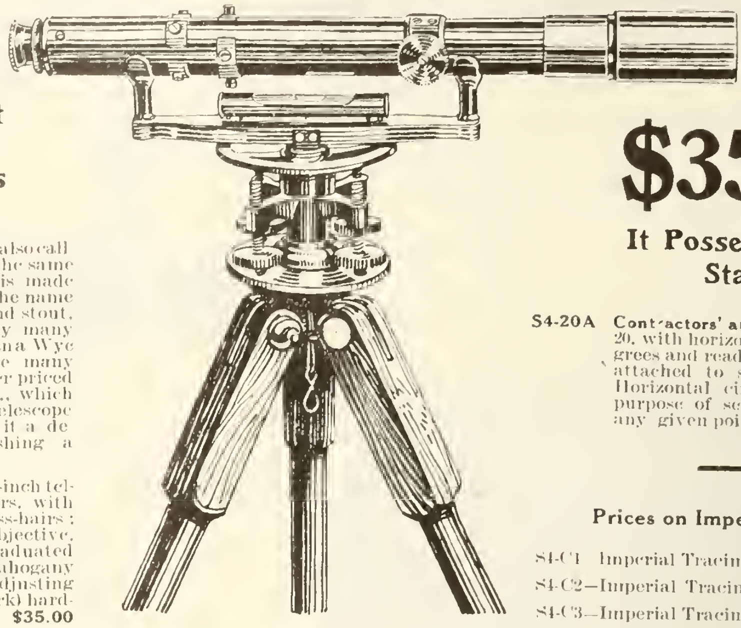

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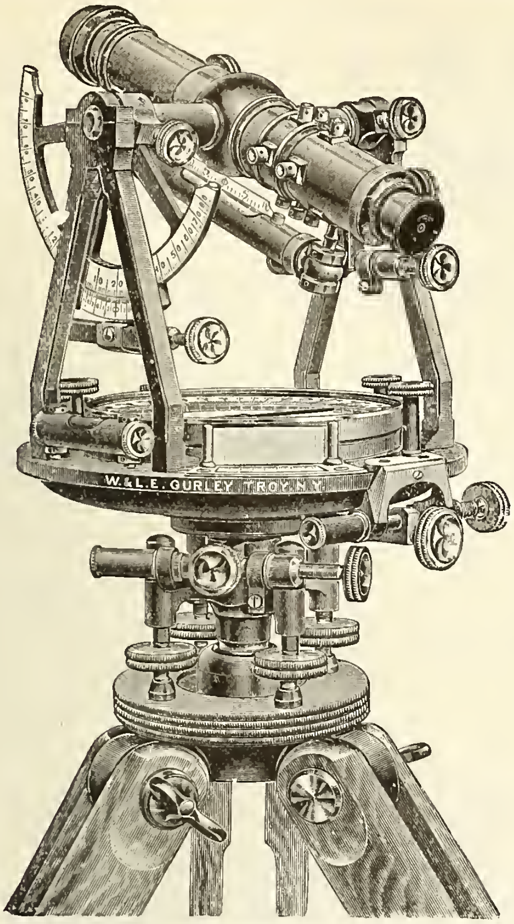
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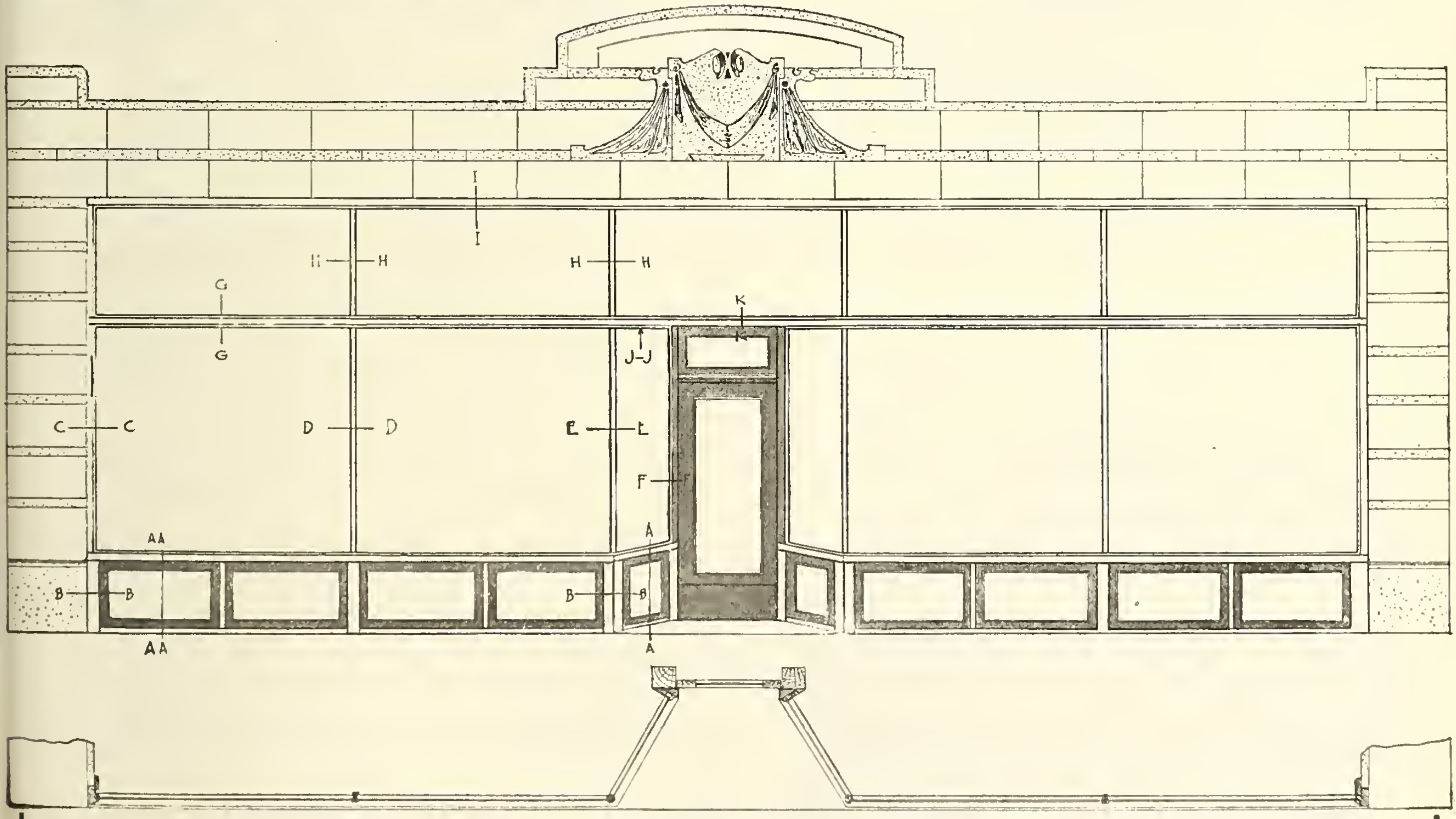

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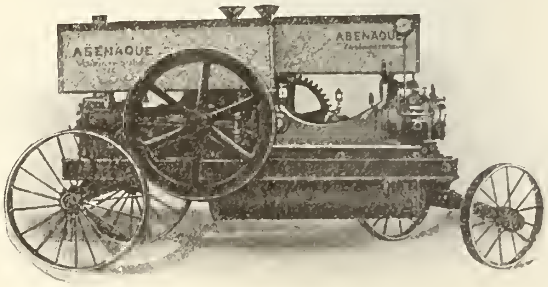

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A little booklet explaining many interesting features concerning the origination and perfecting of "steel interiors." It is agreed by authorities and proven by many actual and severe tests that no matter what precautions you take to fireproof a building, the structure is not nor cannot be "fireproof in reality" if inflammable trim is used, which permits the fire to spread from room to room and floor to floor.

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Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per B
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for oox lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.50	$ 6.75	$ 5.25
40 u. i.	4.25	3.75	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts —Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 per cent.

No. 4 compression bath cock	net $1.75
No. 4½ Fuller's	net $2.35

Square head brass cocks, 65; iron, 65 per cent.

Boilers—Galvanized Iron Range

30 gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)	Black.		Galvanized
¼ inch	1.80	¼ inch	2.57
⅜ "	1.80	⅜ "	2.57
½ "	2.35	½ "	3.23
¾ "	2.75	¾ "	3.83
1 "	3.93	1 "	5.48
1¼ "	5.35	1¼ "	7.49
1½ "	6.44	1½ "	8.98
2 "	8.05	2 "	11.46
2½ "	12.85	2½ "	18.30
3 "	16.86	3 "	24.03
3½ "	22.57	3½ "	33.65
4 "	25.65	4 "	35.90

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-nch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

Crushed stone, 2-inch, $1.30; 1-inch, $1.30; ⅜-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and leads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $3.00.

Manilla Rope, best, per pound, 16½ cents.

PAINTS AND OILS

(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $6.75 to $7.00 per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, 99c. per gallon of 9 lbs.

Raw Linseed Oil, in barrels, 96c. per gallon of 9 lbs.

Turpentine, in barrels, 73c. per gallon.

Pure Red Lead, dry, $5.50 to $6.50 per 100 lbs.

Business Notes

Bracebridge, Ont.

Mr. A. A. Mahaffy, law office, Jas. Thompson, jewelly, S. H. Armstrong & W. M. Ross, grocers, R. H. Ryan, photographer, burned; loss $35,000. No plans yet prepared for rebuilding.

Calgary, Alta.

The Cushing Block was destroyed by fire. Owner, J. O. E. Co., Ltd. Real Estate Agents, Calgary, and Kent Bldg., Toronto. Loss $5,000.

St. Marys, Ont.

The Whelcham Block occupied by Wiley Clothes Pressing Co. and Mrs. McLaren, grocery, burned. Loss $20,000.

Wingham, Ont.

The Beaver Block, owned by W. R. Vanstone, 288 Hyman street, London, burned. Tenants of building: Kings Dry Goods Store, loss $25,000; Smith's hardware, $8,000; Knox's jewellery, $5,000. Total fire loss, $75,000. New block to be built. Temporary quarters and fixtures have been secured by storekeepers.

McMYLER DERRICKS FOR SALE

Locomotive cranes, clam shell buckets, hoisting engines, steam shovel, pile driver, steam hammer, diving suits, stiff leg derricks, turnover buckets, two (2) marine engines, boilers, fuel lighter with whirley aboard. Address

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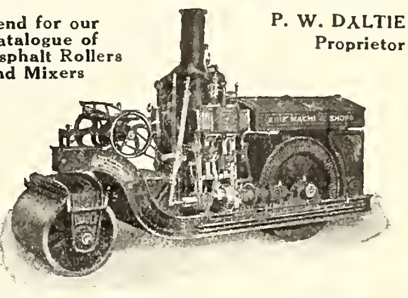

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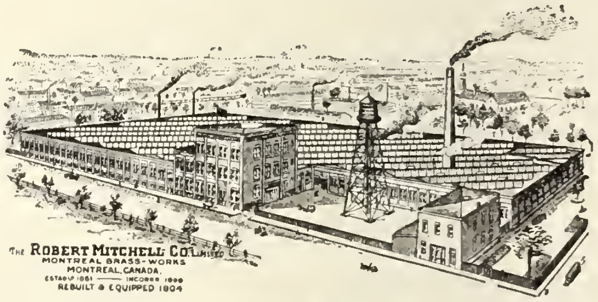
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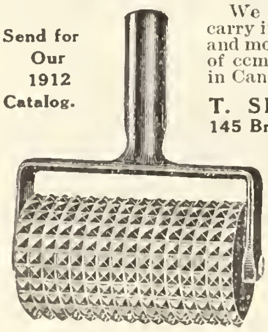

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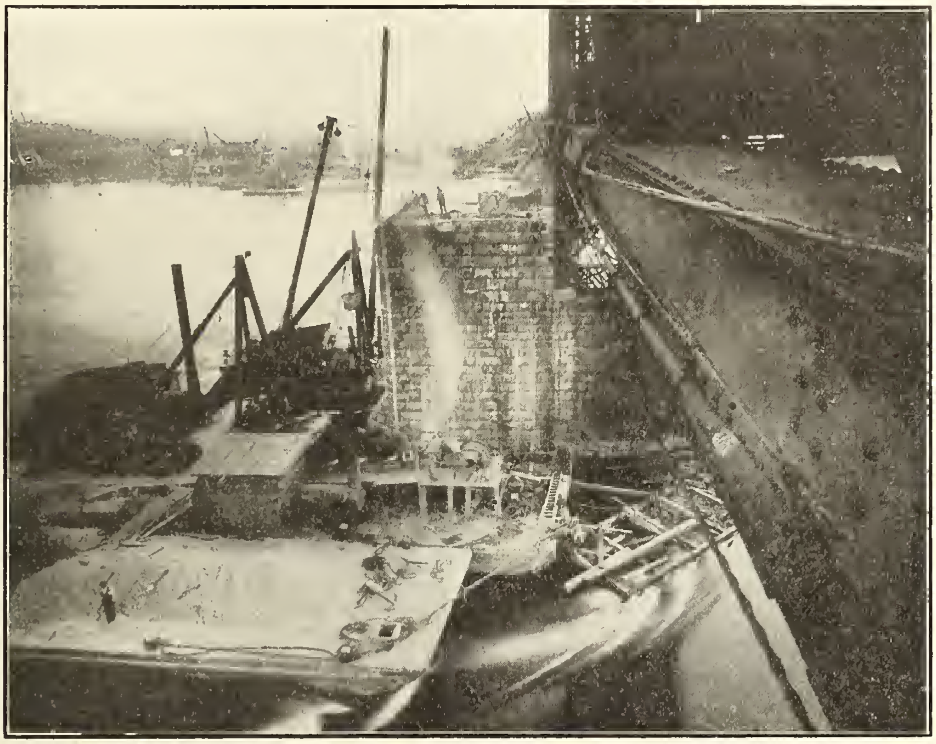

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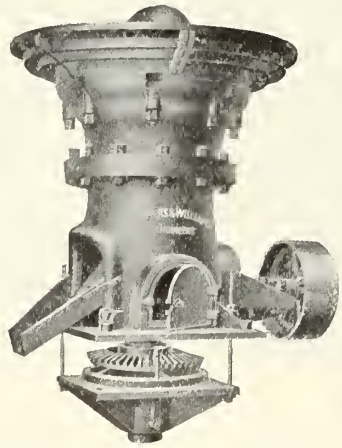

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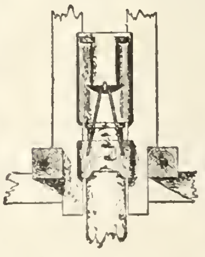

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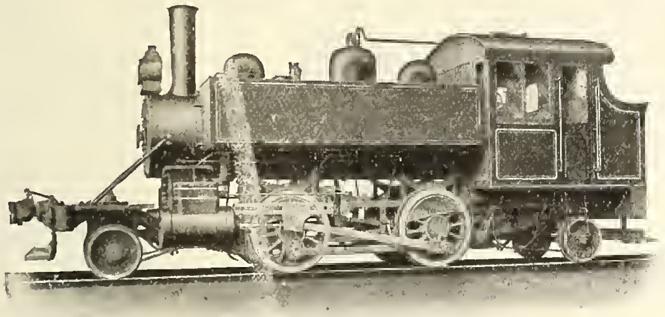

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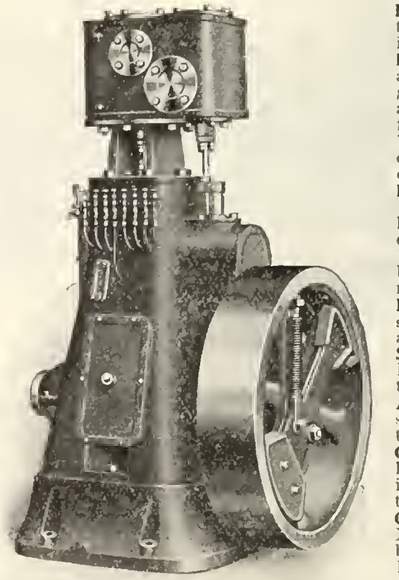

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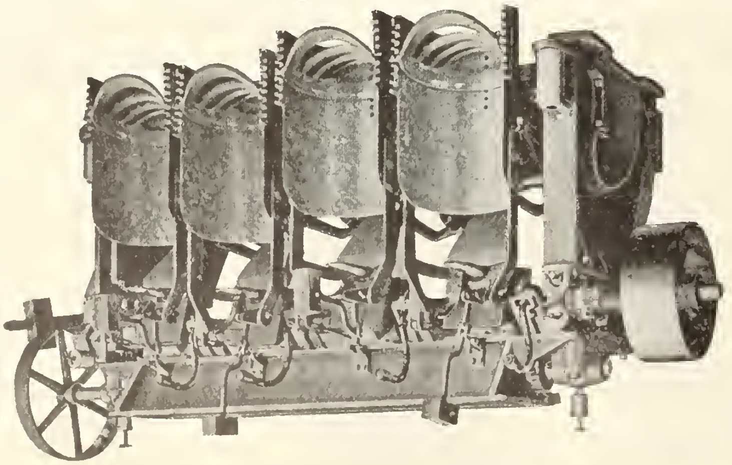

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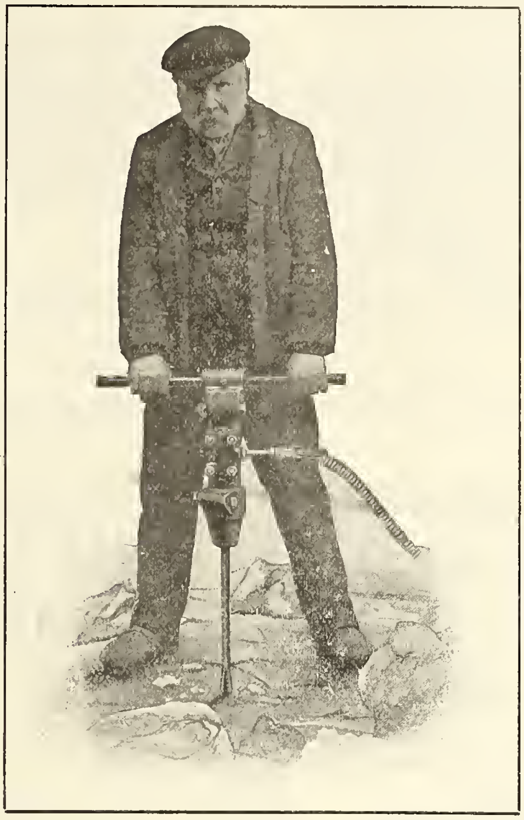

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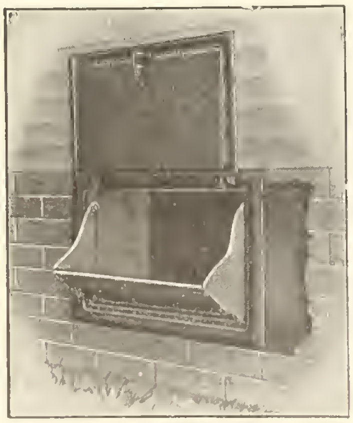

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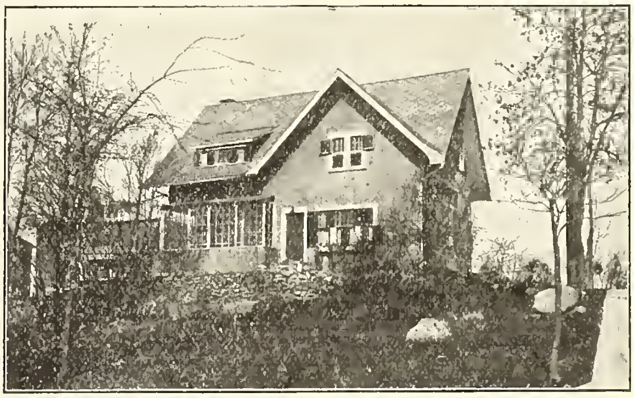

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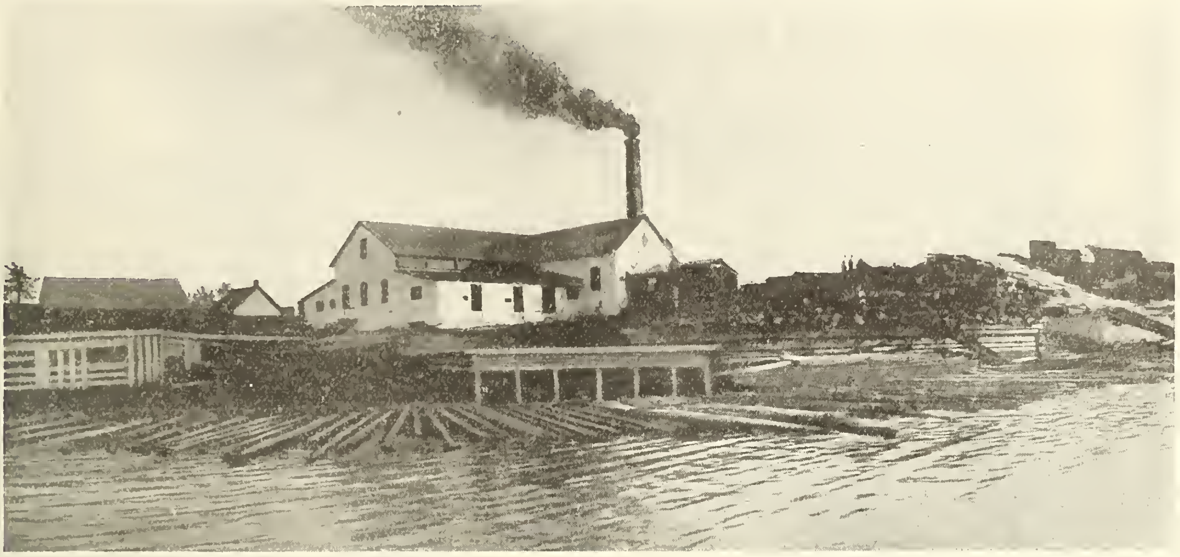

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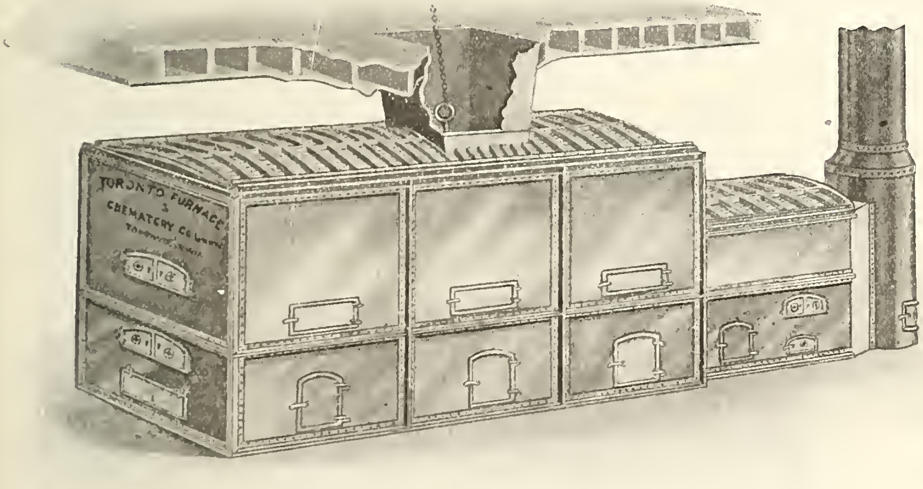

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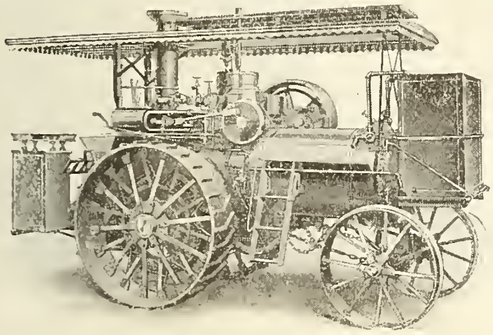

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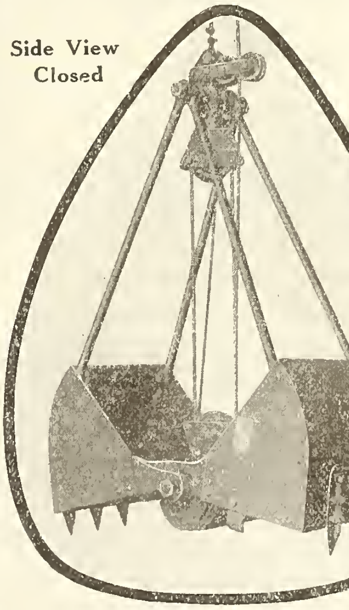

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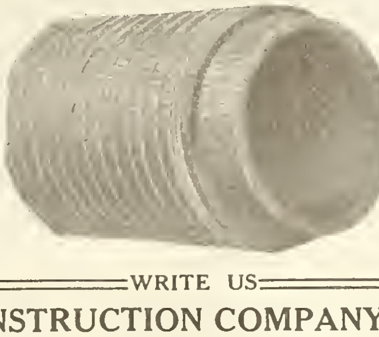

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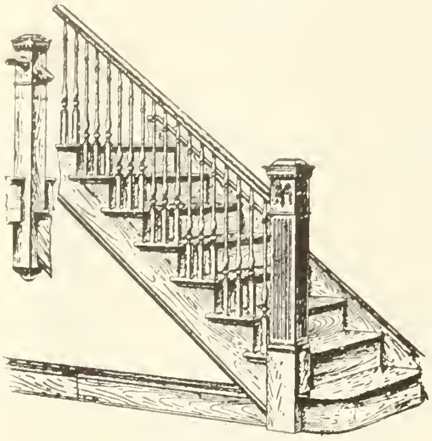

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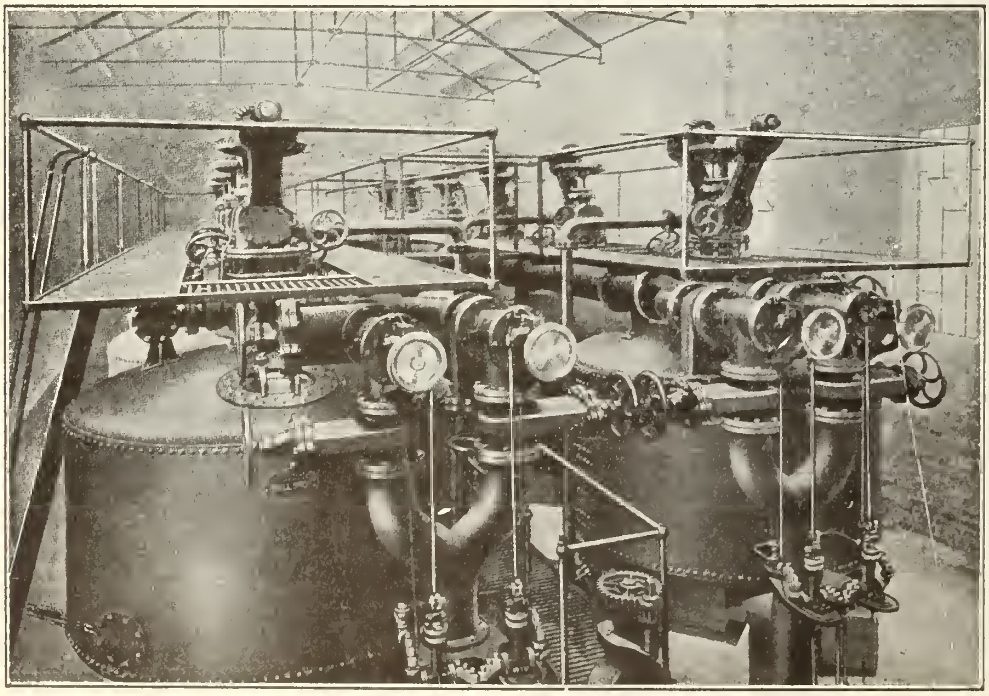

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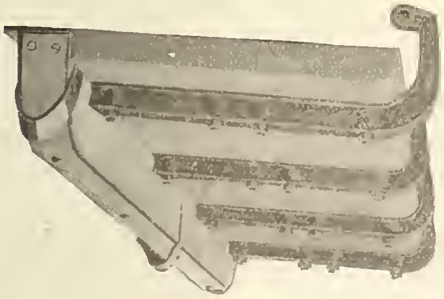

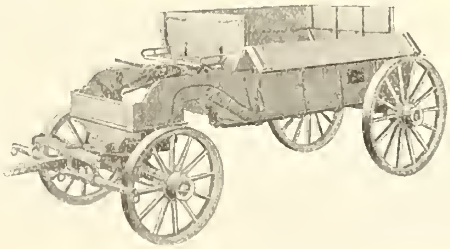

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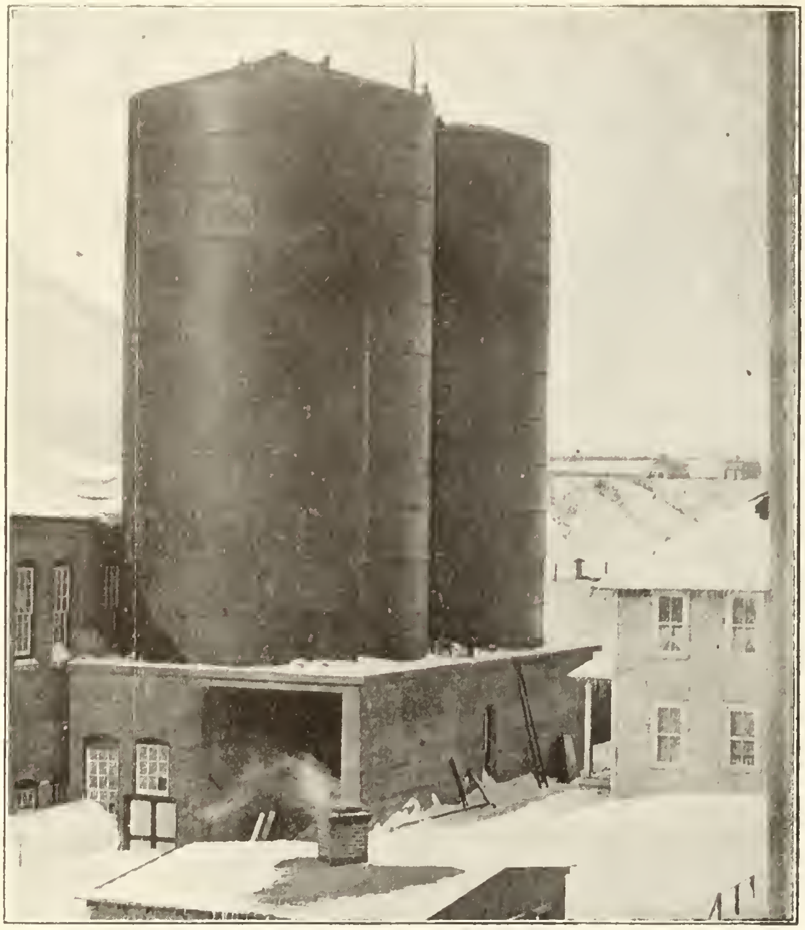

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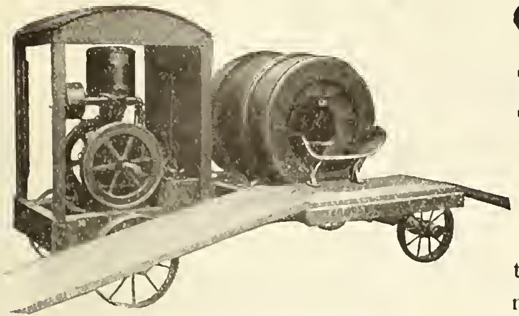

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Low Charging Concrete Mixer

"THE STANDARD" MIXER
with Gasoline engine attachment

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"The Standard" Mixer Will Have Our Patented Low Charging Arrangement and Semi-Automatic Discharge

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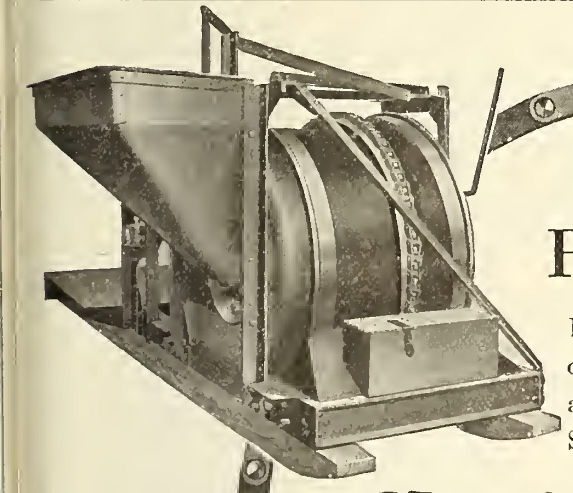

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TONCAN METAL Riveted Culvert

Pedlar's Riveted Culvert has more lateral, narrow and deep corrugations to the foot than any other Culvert made. It is built to specification lengths, from 12 to 84 inches in diameter and can be joined either by a special coupling and girdling clamp, or as shown above. Pedlar's "Toncan" Riveted Culvert makes the ideal Culvert for heavy railroad work and may be graded, bedded and permanently placed with a few hours labor.

On request we will be glad to send catalogue 600 with approved set of specifications adopted by Canadian Railroad Engineers. Catalogue of Pedlar's Nestable Type Culvert will also be sent free on request. While this latter Culvert is lighter than the Riveted Culvert, it is fully up to requirements in the construction of road boxes and other similar light work.

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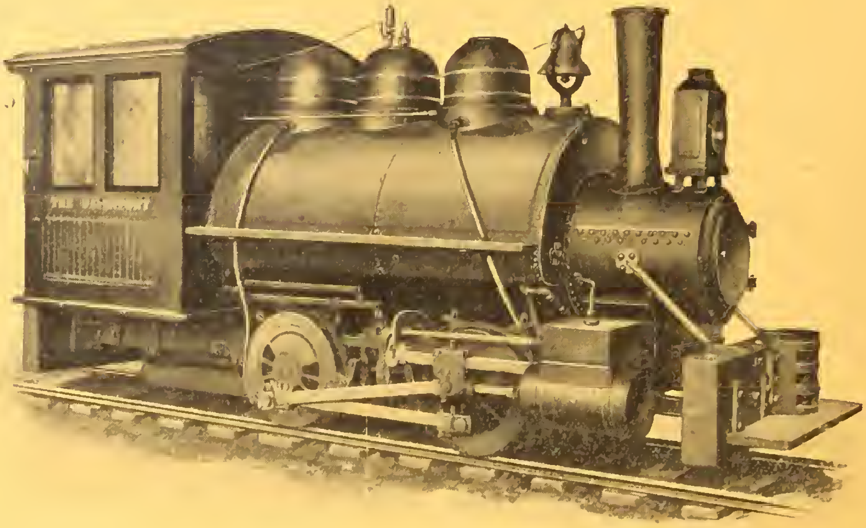

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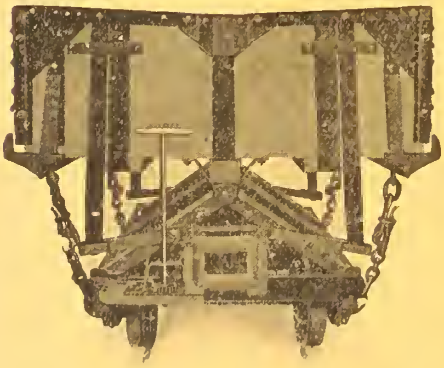

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are stronger—longer running—safer cars—cars that will do work cheaper than any other make to be obtained. Let us tell you why—

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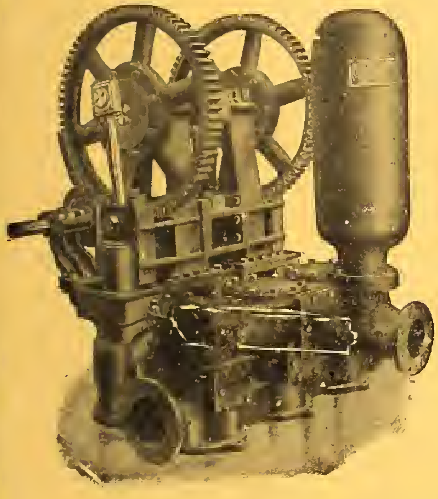

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Made in all
Kinds of
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Simplicity of Design
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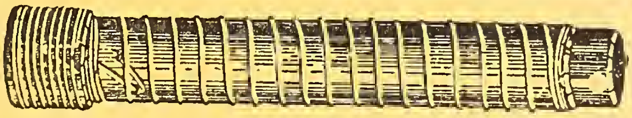

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RESERVOIR TANKS
for city and town Water Systems,
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One-half the cost of Iron Pipe—
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Full Particulars and Estimates Furnished

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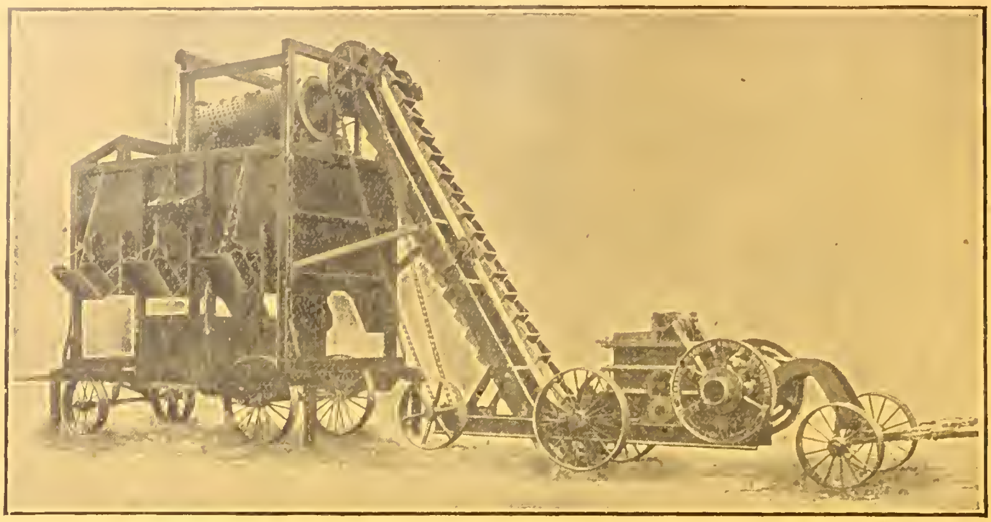

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Crushing Plants

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This cut reproduced from a photograph will give one a good idea of a neat and compact plant.

We have been in the crusher business for years, and our past experience is at your disposal.

Capacity 150 tons in 10 hours.

Size of Crusher 9″ x 16. Will crush to 1½″.

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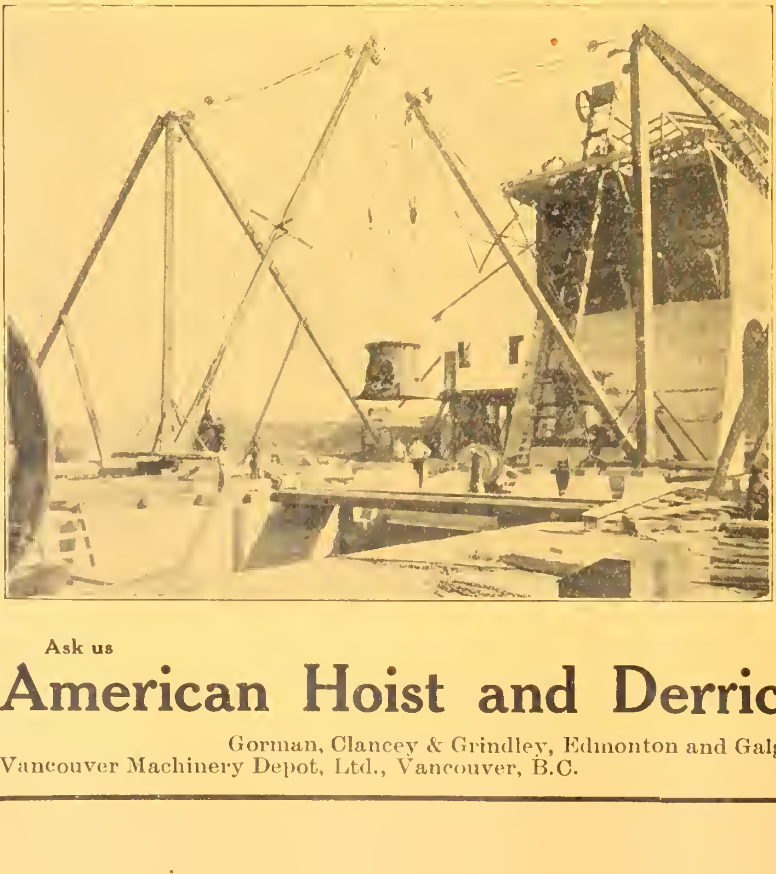

amounts to $2000⁰⁰ and more a day

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HOISTING MACHINERY

is swift and sure. For this reason it has been chosen for the construction of the second largest dam in the world. The $20,000,000 Hydro-electric Power Plant of the Mississippi River Power Co., Keokuk, Iowa.

Have you any use at all for quick-acting, reliable hoisting machinery? If you have, we want an opportunity to demonstrate to your complete satisfaction that

We can save YOU money

Ask us

American Hoist and Derrick Company St, Paul, Minnesota

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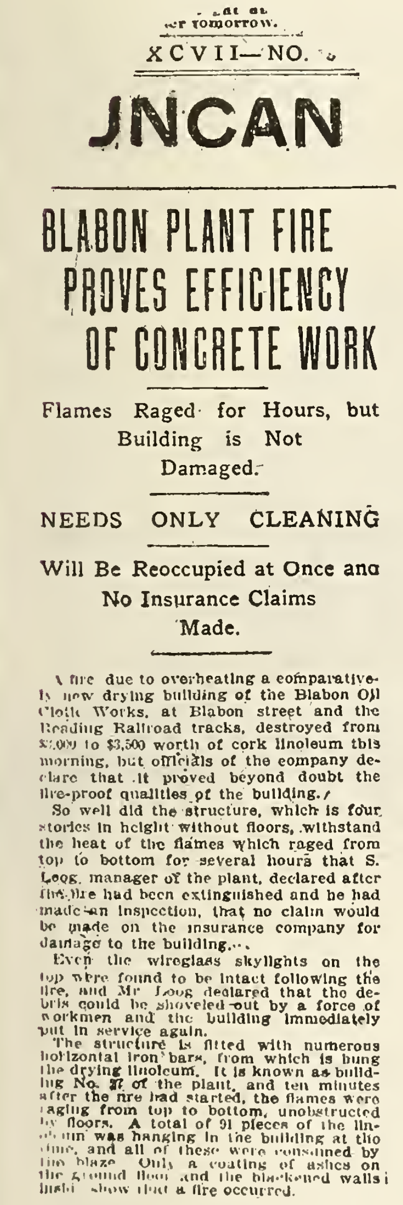


...er tomorrow.

XCVII—NO.

JNCAN

BLABON PLANT FIRE PROVES EFFICIENCY OF CONCRETE WORK

Flames Raged for Hours, but Building is Not Damaged.

NEEDS ONLY CLEANING

Will Be Reoccupied at Once and No Insurance Claims Made.

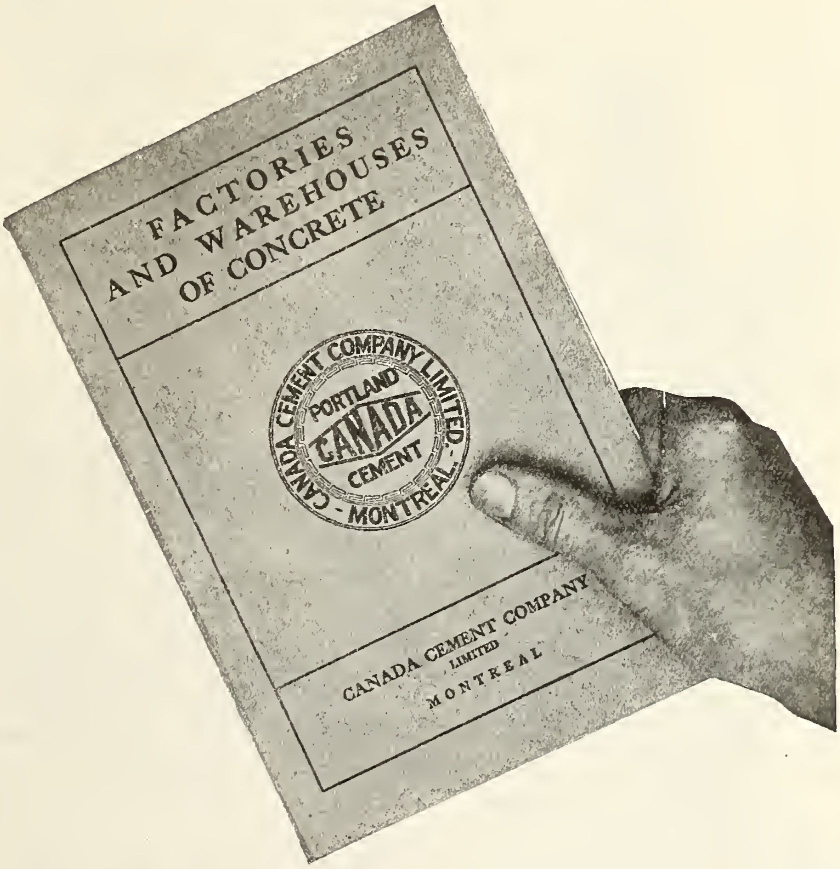
A fire due to overheating a comparatively new drying building of the Blabon Oil Cloth Works, at Blabon street and the Reading Railroad tracks, destroyed from $2,000 to $3,500 worth of cork linoleum this morning, but officials of the company declare that it proved beyond doubt the fire-proof qualities of the building.

So well did the structure, which is four stories in height without floors, withstand the heat of the flames which raged from top to bottom for several hours that S. Loog, manager of the plant, declared after the fire had been extinguished and he had made an inspection, that no claim would be made on the insurance company for damage to the building....

Even the wireglass skylights on the top were found to be intact following the fire, and Mr Loog declared that the debris could be shoveled out by a force of workmen and the building immediately put in service again.

The structure is fitted with numerous horizontal iron bars, from which is hung the drying linoleum. It is known as building No. 37 of the plant, and ten minutes after the fire had started, the flames were raging from top to bottom, unobstructed by floors. A total of 91 pieces of the linoleum was hanging in the building at the time, and all of these were consumed by the blaze. Only a coating of ashes on the ground floor and the blackened walls inside show that a fire occurred.

The article reproduced above appeared as a news item on the first page of the Philadelphia Evening Telegraph, issue February 3rd, 1912. Could there be more striking proof of the value of reinforced concrete fireproof construction.


FACTORIES AND WAREHOUSES OF CONCRETE
CANADA CEMENT COMPANY LIMITED · MONTREAL ·
PORTLAND
CANADA
CEMENT
CANADA CEMENT COMPANY LIMITED MONTREAL

"FACTORIES and Warehouses of Concrete" is the title of this new book which we are distributing to the architects, contractors, engineers, and manufacturers of Canada.

It is the most comprehensive work on the subject of modern fireproof factory and warehouse construction ever written. It contains actual photographs of two hundred and thirty buildings, covering a wide range of architectural types—full data on each building, giving the cost per square foot, per cubic foot, window area, loading, insurance, etc.,—and fac-simile letters from manufacturers occupying these buildings, telling of their **experience** with concrete factories.

There is also an authoritative general discussion of re-inforced concrete construction—which every man interested in building will find valuable and instructive.

No architect, contractor, engineer, or manufacturer can afford to be without this book.

It will be mailed to any business man who asks for it, enclosing twelve cents in stamps to pay postage.

Address:

CANADA CEMENT CO., LIMITED

No. 61 National Bank Building, MONTREAL

Mixer Efficiency

You want the mixer that is reliable.

When you get this reliability, as you understand it in connection with concrete mixers, you have a machine that is a thorough mixer, a speedy worker and durable all through.

All these qualities are combined in

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CONCRETE

MIXERS

That is why they lead all others.

Smith Mixers 8 and 10 years old still in use today.

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Cobalt, opp. Right of Way Mine.

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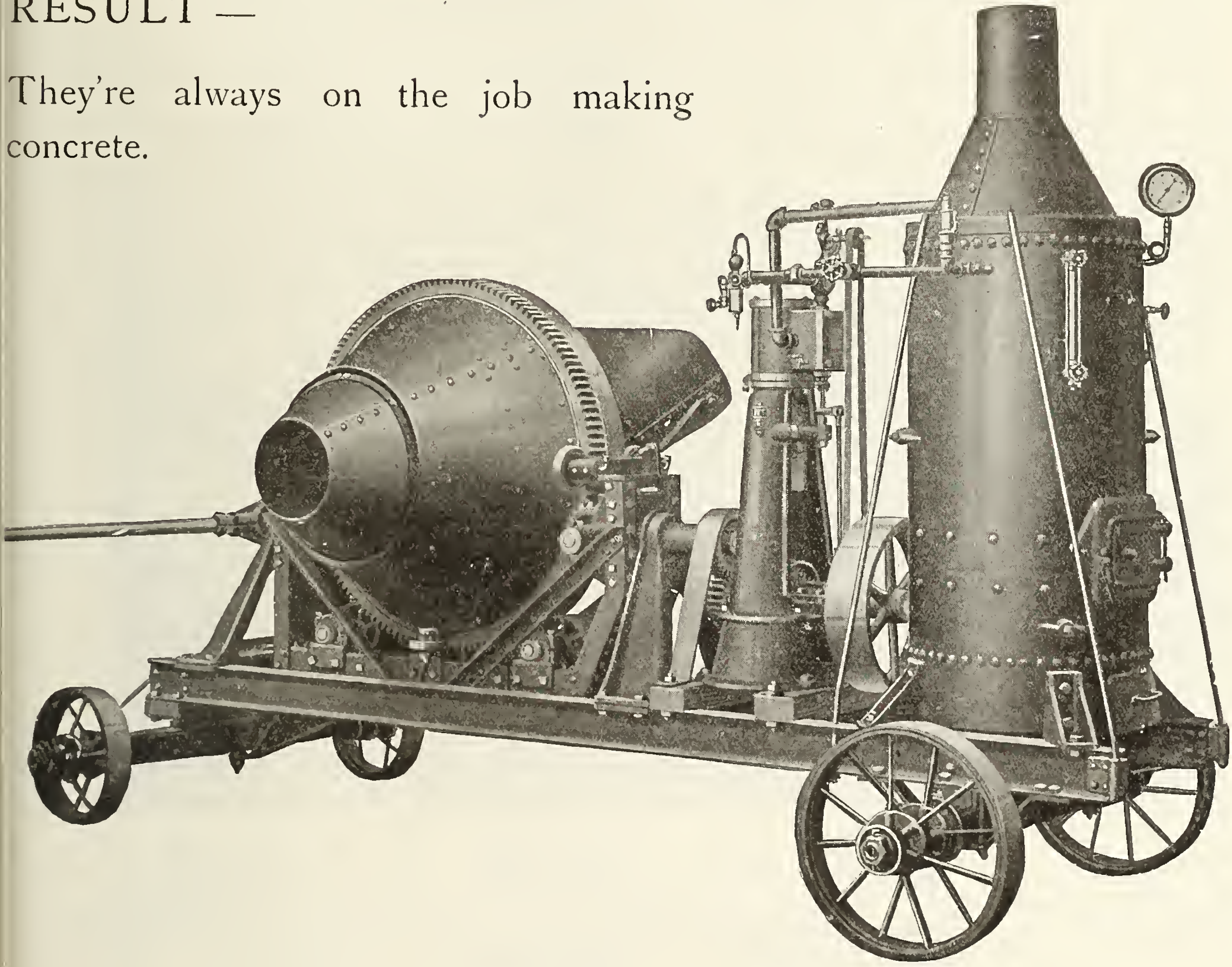
We make them in Montreal, under our own supervision.

We use only the best materials.

RESULT —

They're always on the job making concrete.



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(Continued on page 12)

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Residence of Mr. J. C. Eaton, Toronto. **Messrs. Wickson & Gregg, Architects**

Don Valley Porous Terra Cotta Fire Proofing, Foundation Bricks, Facing Bricks and Enameled Bricks Exclusively Were Used in This Structure

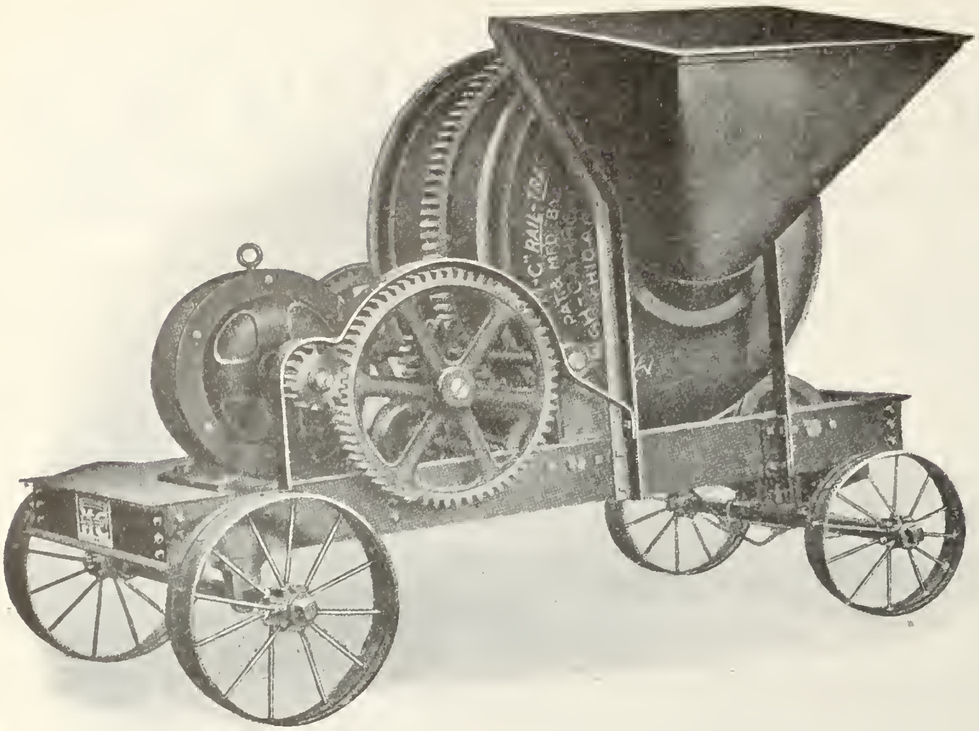
¶ These bricks have been the unanimous choice of discriminating architects and owners in competition with samples submitted by the leading brick firms of Canada and the United States. They are the only thoroughly vitrified facing bricks ever manufactured in the Dominion, and the most exclusive high-class pressed brick on the American continent.

¶ The above view is an illustration of one of the many important buildings in which this product is used.

THE DON VALLEY BRICK WORKS

Head Office: 36 Toronto St., TORONTO

Montreal Agent: **David McGill, 83 Bleury Street**



It's the Details which put this machine head and shoulders above all others.

Get the Catalogue
and find out
WHY
for yourself

Turn last year's repair bills into a bank account this year by using

The M-C Mixer

which reduces repairs to a negligible quantity.

Investigate Anyway

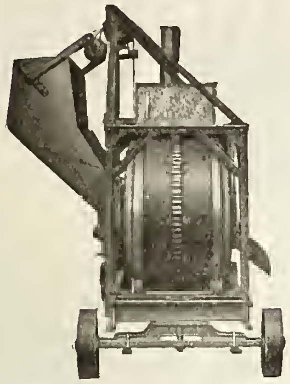
Do this to-day by spending postage on a letter to

The Ford Iron Co.

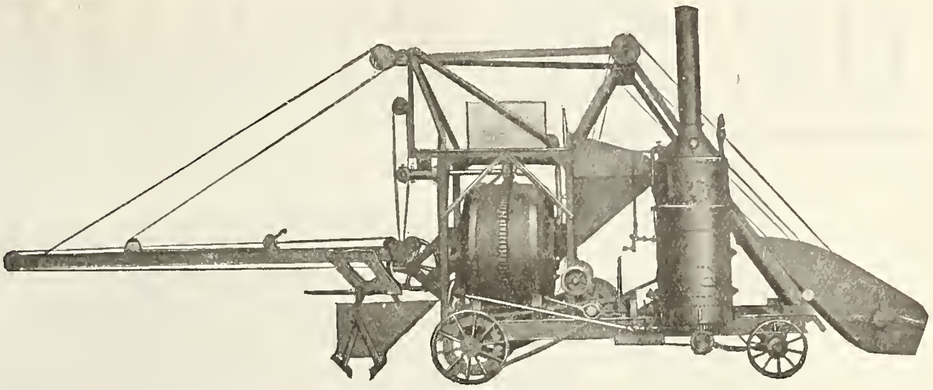
Limited

Montreal

Most Mixing Least Fixing



London Standard Drum Batch Mixer



London Street Paving Mixer with front board and delivery boom

Before you Buy Machinery or Equipment of any kind

write to us for our 1912 CATALOGUE. It will save you TIME and MONEY. Do you know that we are the ONLY LARGE MANUFACTURERS who specialize on

Concrete Machinery and Contractor's Equipment

The following is a few of our lines:

LONDON STANDARD DRUM BATCH MIXER in Five sizes any kind of Power or Equipment.
DRUM PAVING MIXER with Forward Loader and Rear Discharge.
DRUM PAVING MIXER with Side Loader and Rear Discharge.
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CEMENT BLOCK MACHINES.
CEMENT BRICK MACHINES.
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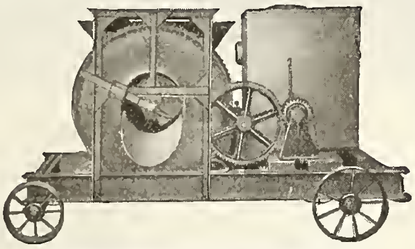

London Standard Drum Batch Mixer

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SILL STEP and **WINDOW CAP MOULDS.**

ORNAMENTAL MOULDS.
ROCK CRUSHER.
SCREEN and **ELEVATORS.**
MASON'S SAND.
SCREENING MACHINE.
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PUMPING OUTFIT.
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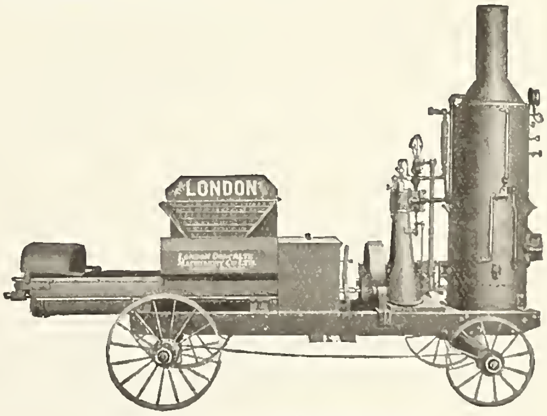
SIDEWALK FORMS.
MATERIAL ELEVATORS.
DRIERS both Portable and Stationary.
FENCE POST MOULDS.
CONCRETE CARTS.
WHEELBARROWS

And a complete line of Cement Working Tools.

London Mortar Mixer



London Automatic Batch Mixer No. 2

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

AGENTS .—
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B. C. Equipment Co., Suite 606-607 Bank of Ottawa Bldg., Vancouver Hamilton Machinery Co., Calgary.
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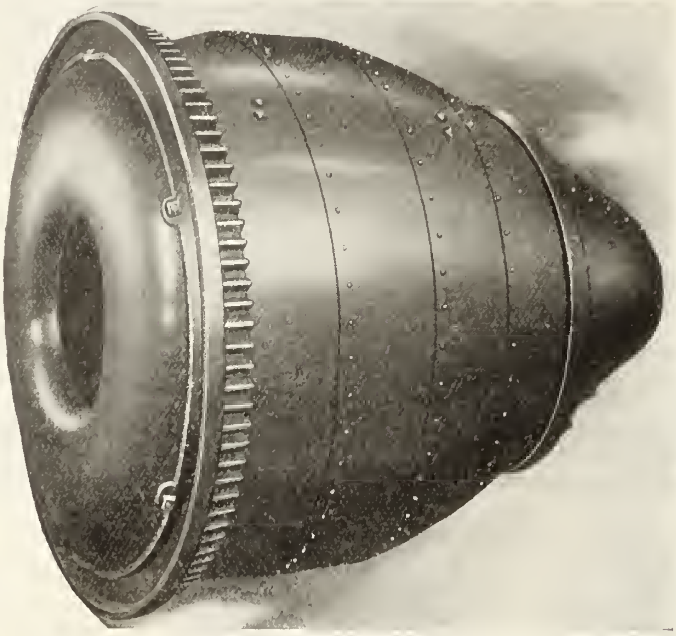
We are the Largest Manufacturers of Concrete Machinery in Canada

THE "HEARTSHAPE" DRUM

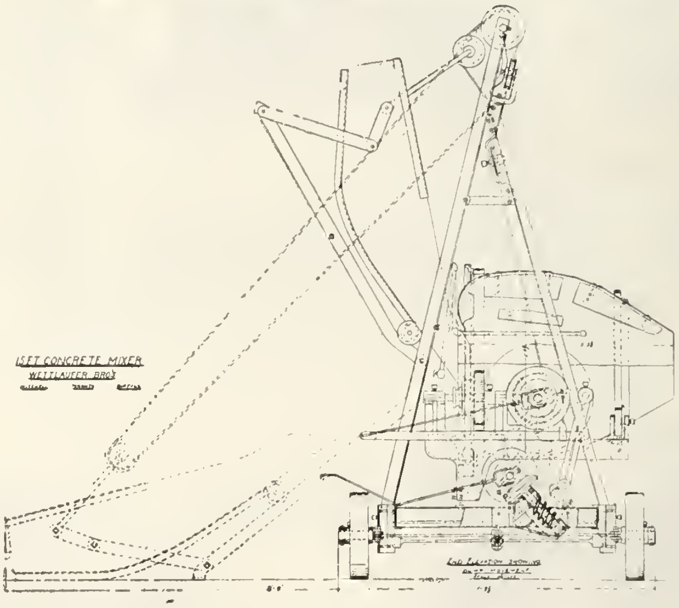
This new improved patent ' Heartshape" drum turns the batch end for end. It thus ENSURES a QUICK and POSITIVE mix.

This shape of drum makes an even distribution of the weight of the batch of concrete thereby lessening the strain on any particular point.



Every detail of the design and construction of this "Heartshape" drum makes for great strength and long life. The wide overlap in the seams as shown in the cut gives it 100% more strength and makes wearing-out almost an impossibility. TEST AFTER TEST HAS PROVED ITS EFFICIENCY.

This front elevation of our Nos. 5 & 6 Mixers show the automatic hopper ready to receive material, also discharging into the drum. Note compactness, simplicity and few parts.



The absence of all complicated working parts in the Wettlaufer "Heartshape" Mixer reduces the liability of a breakdown to a minimum, and renders it easy to control. THE ENTIRE MACHINE IS OPERATED BY ONE MAN.

All parts including all bearings, gears, etc., of Wettlaufer Concrete Mixers are semi-steel castings.
With our new oiling system all bearings are fed direct from the centre of the bearing. By this means all the grit is forced out of the bearings, thus reducing the wear to a minimum and giving the mixer a 50% longer life.

Wettlaufer Bros.

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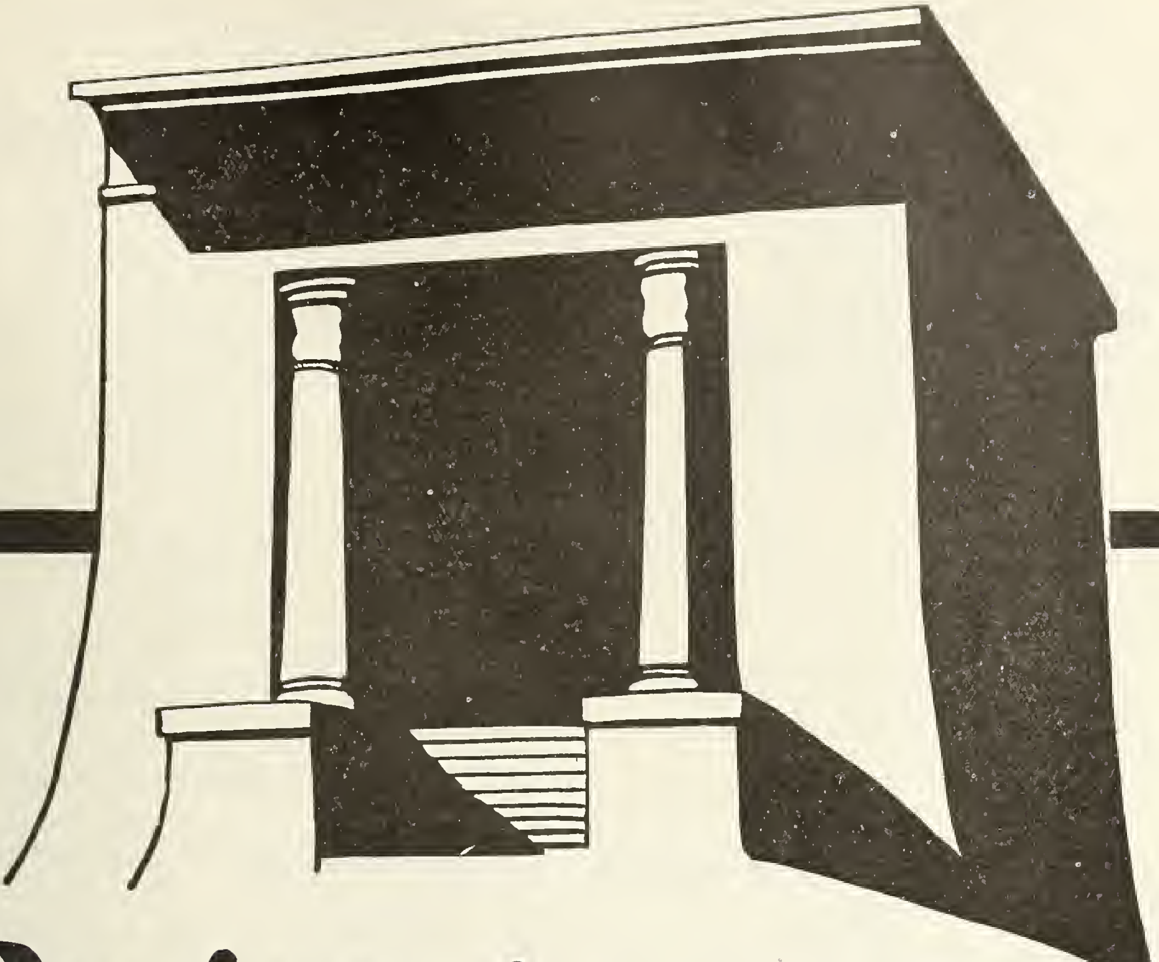

Rogers' Cement

THE Rogers Brands of Portland Cement are carefully *standardized* to an exact formula, that each brand may *always* give the same high and *regular standard* of strength, *regular* period of setting, and *regular binding* qualities for thin mixtures. It is wise to *specify* Rogers Brands on all important concrete construction. The architect benefits in the *finish* and *stability* of the finished structure. The contractor benefits in the *uniformity* and *rapidity* of set. The mills embraced in the Rogers organization are conveniently located for *prompt* shipment at *low freight cost,* and *reserve stock* is available for *emergency* shipments.

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Kirkfield, Orangeville, Owen Sound and Wiarton

Alfred Rogers, Limited

28 West King Street, TORONTO
N. J. Dineen & Co., Western Sales Manager, Winnipeg

5

CLASSIFIED INDEX TO ADVERTISEMENTS—CONTINUED

Hydrants
Canada Iron Corporation
Ford Iron Co.
Gartshore-Thomson Pipe Co.
Kerr Engine Co.

Incinerators
Toronto Furnace Co.
Interior Finish and Doors
Batts Limited
Brennen & Sons, M.
Bryan Mfg. Co.
Canada Office & School Fur. Co.
Eaton & Sons, J. R.
Georgian Bay Shook Mills
Houston Co.
Oshawa Int. Fittings Co.
Rhodes Curry & Co.
Wilson Bros.

Kilns
Berg Machinery Co.
Sturtevant Co., B. F.

Lime
Christie, Henderson & Co.
Jamieson Lime Co.
Ontario Lime Association

Lime Kilns
Improved Equipment Co.

Locomotives
Canadian Boving Co.
Montreal Locomotive Works

Metal Forms
Hotchkiss Lock Metal Form Co

Metal Lath
Galt Art Metal
Greening Wire Co., B.
Metallic Roofing Co.
Noble, C. W.
Pedlar People

Meters, Water
Buffalo Meter Co.
Hopkins & Co., F. H.
McDougall Caledonian Iron Wk
Neptune Meter Co.
Union Water Meter Co.

Oil
"Prime White" Road Oil Co.

Packings and Pipe Coverings
Garlock Packing Co.

Paints and Varnishes
Elaterite Paint Co.
R.I.W. Damp Resisting Paint Co.

Paving and Paving Materials
Dominion Creosoting Company.
Metropolitan Paving Brick Co.
Ontario Asphalt Block Co.

Perforated Metals
Greening Wire Co., B.
Johnson & Chapman Company

Pile Driving Machinery
American Hoist & Derrick Co.
Browning Engineering Co.
Canadian Rand Co.
Vulcan Iron Works

Pipe
American Spiral Pipe Works
Canadian Pipe Co.
Dominion Concrete Co.
Dominion Wood Pipe Co.
Eastern Pipe & Construction Co.
Ford Iron Co.
Gartshore-Thomson Pipe Co.
Munderloh & Co.
National Iron Works
Pacific Coast Pipe Co.
Pedlar People
Piggott & Co., Thos.
Steel Co. of Canada.

Plaster
Albert Mfg. Co.
Britnell & Co.
Ontario Lime Association

Plug Drillers
Canadian Rand Co.

Plumbers' Supplies
Standard Ideal Co.

Pneumatic Machinery
Canadian Rand Co.

Portable Saw
Canadian Fairbanks

Power Engines
Inglis Co., John

Pumps and Pumping Machinery
Abenaque Machine Works
American Well Works
Bates & Edmonds
Beatty & Sons, M.
Canada Foundry Co.
Canadian Boving Co.
Canadian Rand Co.
Cook, A. D.
Escher Wyss & Co
Hopkins & Co., F. H.
Inglis Co., John
McDougall Caledonian Iron Wks
Smart-Turner Machine Co
Waterous Engine Works Co.
Mussens Limited
Ontario Wind Eng. & Pump Co.

Quarry Machinery
Canadian Rand Co.
Improved Equipment Co.
Johnston & Chapman
George Anderson & Co.

Railway Supplies
Ford Iron Co.
Gartshore, John J.
Hopkins & Co., F. H.
Mussens Limited

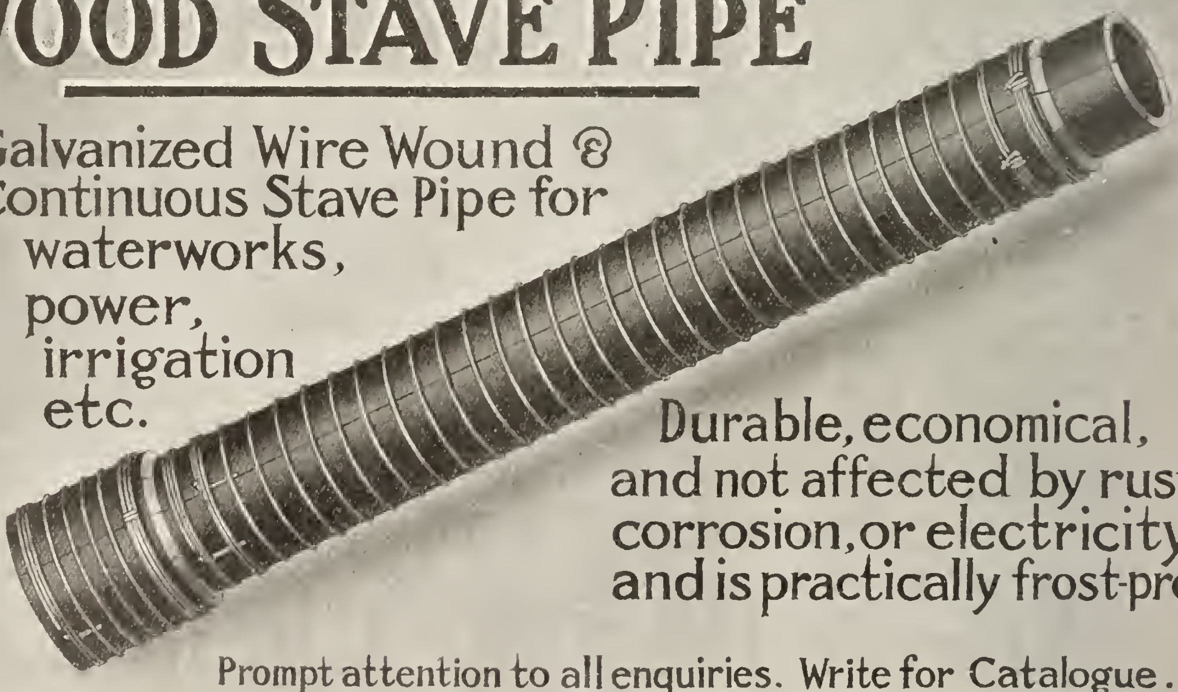
Reinforcements, Concrete & Steel
Ambursen Hydraulic Cons. Co.
Canada Wire & Iron Goods Co.
Factory Products
Ford Iron Co.
Greening Wire Co., B.
Leach Contracting Co.
Page Wire Fence Co.
Steel Co. of Canada
Trussed Concrete Steel Co.
Turner, C. A. P.

Revolving Stone Screens
Greening Wire Co., B.
Johnson & Chapman Company

Road Machinery
Erie Machine Co.
Ford Iron Co.
Hamilton Machinery Co.
Huber Manufacturing Co.
Morrison & Co., T. A.
Mussens Limited
Western Wheeled Scraper Co.
Waterous Engine Works Co.

Roofing Materials
Asbestos Mfg. Co.
Can. H. W. Johns-Manville Co.
Canadian Supply Company
Galt Art Metal Co.
Metallic Roofing Co.
Metal Shingle & Siding Co.
Noble, Clarence W.

(Continued on page 14)



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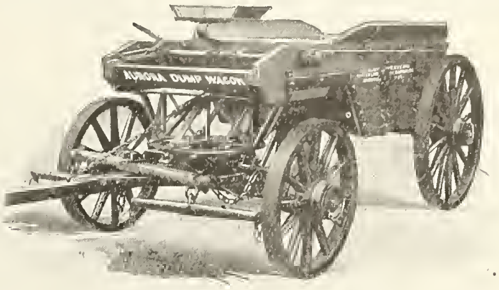

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Chains entirely outside of bed, direct pull of chain on doors and length of chains adjustable.

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Study its sturdy construction—its mechanical, labor-saving and dependable qualities. Catalog for the asking.

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You can do it only if the bucket opens wide.
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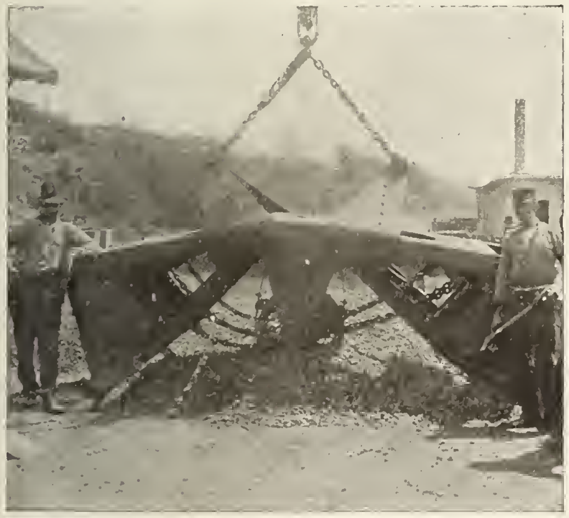

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CLASSIFIED INDEX TO ADVERTISEMENTS—Continued

- Rubber Belting
  - Goodyear Tire & Rubber Co.
- Safes and Vaults
  - Taylor, J. & J.
- Sand and Gravel
  - Sand & Supplies
  - York Sand and Gravel Co.
- Screens
  - Greening Wire Mfg. Co., B.
  - Johnson & Chapman Company
- Sewer Pipe
  - Britnell & Co.
  - Canada Iron Corporation
  - Dominion Sewer Pipe Co.
  - Ford Iron Co.
  - Gartshore Thomson Pipe Co.
  - National Iron Works
  - Ontario Sewer Pipe Co.
  - Ontario Lime Association
  - Smyth & Ryan
  - Standard Drain Pipe Co.
- Sewer Trenching
  - Austin Drainage Excavator Co.,
  - Mun. Engineering & Contracting Company
- Shovels
  - Lundy Shovel & Tool Co.
- Shovels (Steam)
  - Browning Engineering Co.
  - Beatty & Sons, M.
  - Canada Foundry Co.
  - Ford Iron Co.
  - Hopkins & Co., F. H.
  - Montreal Locomotive Works
  - Mussens Limited
  - Willis Shaw Mach. Co.
- Smoke Stacks
  - Des Moines Bridge Co.
- Steam Apparatus
  - Sturtevant Co., B. F.
- Steam Turbines
  - McDougall Caledonian Iron Wks.
- Steel Bars
  - Factory Products
  - Steel Co. of Canada
- Steel Shingles and Ceilings
  - Galt Art Metal Co.
- Stone
  - Britnell & Co.
  - Brodie, Jas.
  - Christie, Henderson & Co.
  - Consolidated Stone Co.
  - Contractors' Supply Co.
  - Corinthian Stone Co.
  - Crushed Stone, Limited
  - Doolittle & Wilcox
  - Hagersville Contracting Co.
  - Laurentian Granite Co.
  - Mahan & Company
  - McMillan & Son, W.
  - Morrison & Co., T. A.
  - Myers, Oakley
  - Queenstown Quarry Co.
  - Roman Stone Co.
  - Sackville Freestone Co.
  - Sand & Supplies
  - Smyth & Ryan
- Stone Saws
  - Anderson, Geo.
- Store Fronts
  - Canadian Store Front Co.
- Structural Iron and Steel
  - Canada Steel Co.
  - Des Moines Bridge Co.
  - Dominion Bridge Co.
  - Factory Products
  - Ford Iron Co.
  - Mackinnon Holmes & Co.
  - Steel Co. of Canada
  - Phoenix Bridge & Iron Works
  - Reid & Brown
  - Sarnia Bridge Co.
- Submarine Diver
  - Rouleau, Joseph N.
- Submarine Drills
  - Canadian Rand Co.
- Tanks and Stand Pipes
  - Berg Machinery Co.
  - Des Moines Bridge Co
  - Inglis, John
  - Jenckes Machine Co.
  - Marsh & Henthorn
  - McDougall Caledonian Iron Wks
  - Ontario Wind Eng. & Pump Co.
  - Piggott & Co., Thos.
- Technical Journals
  - Ainsworth & Sons, Wm.
- Tents
  - Turner & Sons, J. J.
  - Woods Limited
- Testing and Inspection Bureau
  - Hunt & Co., Robt. W.
- Valves
  - Canada Iron Corporation
  - Gartshore-Thomson Pipe Co.
  - Kerr Engine Co.
- Ventilating & Heating Apparatus
  - Sturtevant Co., B. F.
- Veterinary Remedies
  - Johnson, A. H.
- Waterproofing
  - Can. H. W. Johns-Manville Co.
  - Ceresit Waterproofing Co.
  - Chillas-Black
  - Elaterite Paint Company
  - Ontario Lime Association
- Water Softeners and Filters
  - American Water Softener
  - Berg Machinery Co.
- Water Turbines
  - Canadian Boving Co.
  - Escher Wyss & Co.
  - McDougall Caledonian Iron Wk
- Water Wheels
  - Canadian Boving Co.
  - McDougall Caledonian Iron Wks
- Wires and Cables
  - Canada Wire and Cable Co.
  - Factory Products
  - Ford Iron Co.
- Wire Guards and Screens
  - Canada Wire & Iron Goods Co.
  - Crescent Wire Iron Works
  - Greening Wire Co., B.
- Wire Rope
  - Canada Wire and Cable Co.
  - Ford Iron Co.
  - Greening Wire Co., B.
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ALPHABETICAL LIST OF ADVERTISERS

Abenaque Machine Works 86
Ainsworth & Sons, Wm. 84
Albert Manufacturing Co.
Alsen's American Portland Cement Works. 96
Ambursen Hydraulic Construction Company of Canada, Limited 104
American Enameled Brick & Tile Co. 82
American Hoist & Derrick Co. 2
American Spiral Pipe Works 79
American Surety Company 82
American Water Softener Company 100
Anderson & Co., 1905 Ltd., George 22
Andresen, H. P. 13
Asbestos Mfg. Co. 99
Austen Drainage Excavator Co., Ltd. 34
Automatic Wood Box & Turning Co. 82

Bain & Ross 92
Bates & Edmonds Motor Co. 23
Batts Limited
Beatty & Sons Limited, M. 79
Beckman Company, L. 84
Bell Filtration Co. of Canada, Limited 109
Bennett, Robert 98
Berg Manufacturing Company
Blystone Manufacturing Company 99
Bowman & Connor 92
Bremner Limited, Alex. 91
Briscall, William 93
Britnell & Co., Ltd. 86
Brodie & Company, James 94
Brown Hoisting Machinery Co. 83
Browning Engineering Company
Buffalo Meter Company 27
Business Systems Limited 81
Bryan Manufacturing Company

Cabot, Samuel 93
Canada Cement Company, Ltd. 3
Canada Foundry Co., Ltd. 20-77-97
Canada Iron Corporation Limited 91
Canada Steel Company 31
Canadian Store Front Company 85
Canada Wire & Cable Company 23
Canada Wire & Iron Goods Co. 79
Canadian Boving Company 30
Canadian Bridge Co., Ltd. 88
Canadian Fairbanks-Morse Co., Ltd. 22
Can. H. W. Johns Manville Co.
Canadian Kellogg Company 35
Canadian Mineral Rubber Company 14
Canadian Office and School Furniture Company, Limited
Canadian Norcross Bros. Co. 18
Canadian Pipe Company, Limited 90
Canadian Rand Company, Limited 107
Canadian Supply Company 78
Cement Era Publishing Company
Ceresit Waterproofing Company
Chain Belt Company
Chalmers & Williams
Chipman & Power 92
Christie Henderson & Company 79
Cleveland Bridge & Engineering Co., Ltd. 88
Cleveland & Erie Mach. Co. 87
Cloisonne Glass Limited 93
Colonial Glass Co. of Canada 93
Cook, A. D. 100
Commercial, The 87
Conduits Company, Limited 91
Consolidated Glass Company
Consumers' Gas Company 105
Consolidated Optical Co., Ltd.
Consolidated Stone Company 100
Contractors' Supply Co., Ltd. 86
Corinthian Stone Company 24
Cream City Equipment Company 94
Crushed Stone Limited 81

Dahlstrom Metallic Door Company 86
Dennis Wire & Iron Works Co., Ltd. 90
Des Moines Bridge & Iron Co. 79
Dickson Bridge Works Co., Ltd.
Doolittle & Wilcox, Limited 91
Dominion Bridge Co., Limited 88
Dominion Concrete Company 80
Dominion Creosoting Company 28
Dominion Marble Company, Ltd. 21
Dominion Sewer Pipe Co., Ltd. 21
Dominion Wood Pipe Co., Limited 12
Don Valley Brick Works 7
Down Draft Furnace Company 98

East Iron & Machine Company 96
Escher Wyss Company
Elaterite Paint Company
Eastern Pipe & Construction Co., Ltd. 103
Eaton & Company, T. 84
Erie Machine Shops 94

Factory Products Limited 35
Farmer, John T. 92
Ferguson, H. S. 92
Ford Iron Company, Limited 8
Foundation Company
Fuce, Edward O. 92

Galt Art Metal Company, Limited 100
Galt Engineering Co., John 92
Garlock Packing Company
Gartshore, John J. 92
Gartshore-Thompson Pipe & Foundry Company, Limited 90
General Machinery Co., Limited
Georgian Bay Shook Mills, Limited
Gibb, Alexander 101
Goodyear Tire & Rubber Co. of Canada, Ltd. 33
Greening Wire Co., Ltd., B. 106
Guarantee Company of North America 92
Gurley, W. & L. E. 85

Hagersville Contracting Co., Ltd. 13
Hamilton Pressed Brick Company
Hamilton Machinery Company, Limited 26
Hancock, Jr., H. Syd. 92
Harvey, J. 87
Heinicke Inc., H. R.
H. & E. Lifting Jack Company
Hepburn, John T. 25
Hobbs Manufacturing Co., Ltd. 93
Holmes & Sons, Fred
Hopkins & Company, F. H. 112
Hotchkiss Lock Metal Form Co. 26
Huber Manufacturing Company 103
Hunt & Company, Robert W. 92
Hunter Bridge & Boiler Co., Ltd. 89

Imperial Wire & Cable Co., Ltd. 111
Improved Equipment Company
Inglis Company, John 75
International Marine Signal Co., Ltd. 29

Jamieson Lime Company
Jenckes Machine Company, Limited 2
Johnston, A. H. 94
Johnston & Chapman Company

Kennedy, James C. 92
Kerr Engine Company, Limited 102
Koehring Machine Co. 32

Laurentian Granite Co., Ltd. 92
Laurie & Lamb 1
Lea, R. S. 92
Leach Concrete Company
Leonard & Sons, E. 81
London Concrete Machinery Co., Ltd. 9
London Gas Power Company, Ltd. 76
Lundy Shovel & Tool Company 80
Luxfer Prism Company 106

Mace, T. Harry 92
MacKinnon Holmes & Co., Ltd.
MacLean Daily Reports 98
Marsh & Henthorn Limited 76
McCoy Company, Henry J. 23
McDougall Caledonian Iron Wks. Co., John 77
Mahan & Company
McMillan & Son, W.
McNally & Company, William 89
Meadows, George B. 35
Metallic Roofing Company, Limited 76
Metropolitan Paving Bricks Co. 31
Miller & Company, George M.
Mitchell Company, Ltd., Robert 88
Missisquoi Marble Co., Ltd. 82
Montreal Locomotive Works, Ltd. 81
Morrison & Co., T. A. 92
Munderloh & Co., Ltd. 13
Mussens Limited 4
Myers, Oakley 81
Municipal Engineering & Contracting Co.

National Bridge Co., of Canada, Ltd. 89
National Iron Works Limited 91
Neptune Meter Company 27
Noble, Clarence W. 96
Northwestern Terra Cotta Company 83

Ontario Asphalt Block Co., Limited 96
Ontario Lime Association Limited 95
Ontario Sewer Pipe Co., Ltd. 20
Ontario Wind Engine & Pump Co., Ltd. 81
Ormsby, Limited, A. E. 17
Oshawa Interior Fittings Co. 101
Owen Bucket Company 103

Pacific Coast Pipe Company, Limited 1
Page Wire Fence Company, Ltd. 83
Pedlar People Limited 110
Piggott & Company, Thos. 103
Phoenix Bridge & Iron Works, Limited 89
Port Credit Brick Co., Ltd. 90
Power & Son
"Prime White" Road Oil Company 108
Pyle-National Electric Headlight Co. 19

Queenstown Quarry Co., Ltd. 91

Reid & Brown 92
Rhodes Curry Company, Limited 76
"R. I. W." Damp Resisting Paint Co. 19
Rogers Limited, Alfred 11
Roman Stone Co., Limited 15

Sackville Freestone Company, Ltd. 29
Sand & Supplies, Limited 89
Sarnia Bridge Company, Limited 89
Sheppard & Sons, James
Slack, T. 92
Smart-Turner Machine Co., Ltd. 1
Smith, Limited, Thomas & William
Smith Foundry Company 78
Smyth & Ryan 101
Standard Drain Pipe Co., Ltd. 21
Standard Foundry & Machine Company
Standard Ideal Company, Limited 36
Standard Scale & Supply Company 109
Steel Company of Canada 30
Steward, A. P. 96
Stinson-Reeb Builders' Supply Co. 36
Sturtevant, B. F. 94

Taylor, J. & J. 101
Tide Water Iron Works 95
Thew Automatic Shovel Co., The. 31
Thompson & Co., B. & S. H. 21
Tiffin Wagon Company
Toledo Wheelbarrow Company 101
Toronto Furnace & Crematory Co.
Toronto Plate Glass Importing Co., Ltd. 1-83
Trussed Concrete Steel Company 82
Turner, C. A. P. 105
Turner & Sons, J. J. 99

Union Water Meter Co. 27
Universal Crusher Company 26
Urschel Bates & Company

Vulcan Iron Works 94

Wadsworth Howland & Co., Inc. 79
Waterous Engine Works Co., Ltd. 95
Watson Wagon Company
Watts & Son, E. R. 32
Weeks, Arthur L. 92
Wells & Gray, Limited
Western Canada Contractor 86
Western Wheeled Scraper Company 13
Wettlaufer Bros. 10
Whitehead & Co., Ltd., John 111
Wilson Bros., Ltd. 104
Woods Limited 27

York Sand & Gravel Co. 86

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"CEMENT FILLER" and "CEMENT FLOOR PAINT"

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ESTABLISHED 1848

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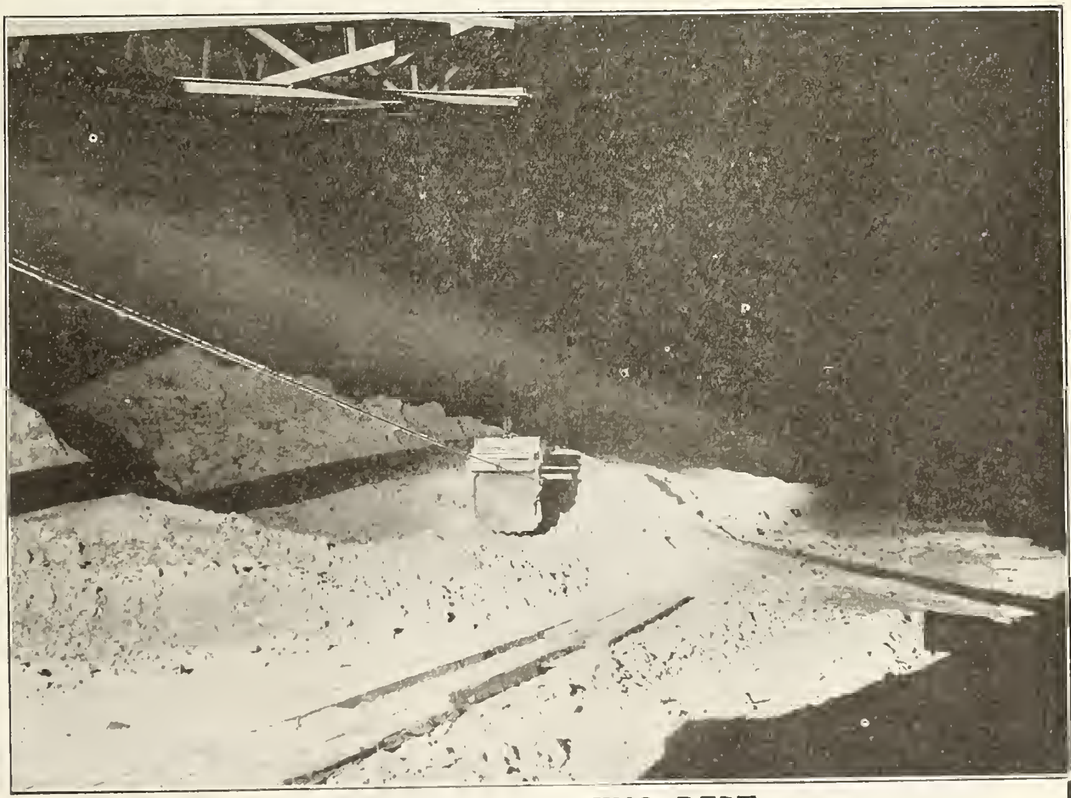

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NOR EVEN
TIME ARE
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successfully withstands all acids and gases of sewage, which no other kind of pipe will do, and once properly laid, will never need replacing.

We have over 300 cars of Vitrified Clay Pipe in stock now ready to take prompt care of Spring trade. It will be a picnic for us to fill your order with dispatch.

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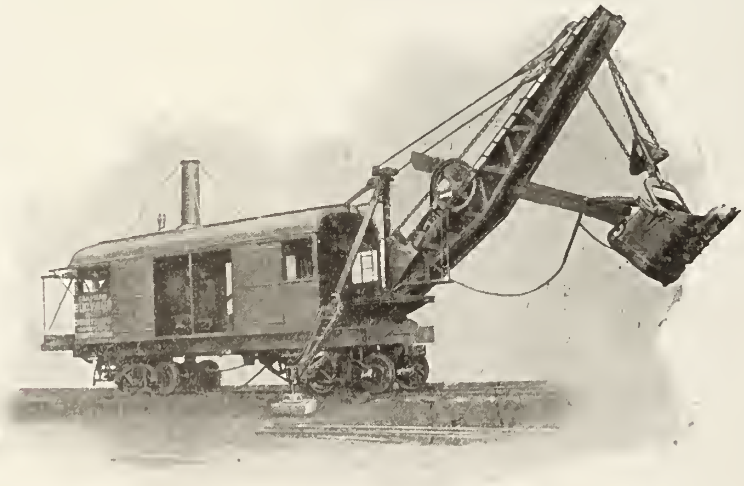
Canadian Bucyrus Steam Shovels



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One 45 ton Canadian Bucyrus Steam Shovel, the only one remaining of our last stock order, ready for shipment. More shovels now being built, can make short deliveries on any size.

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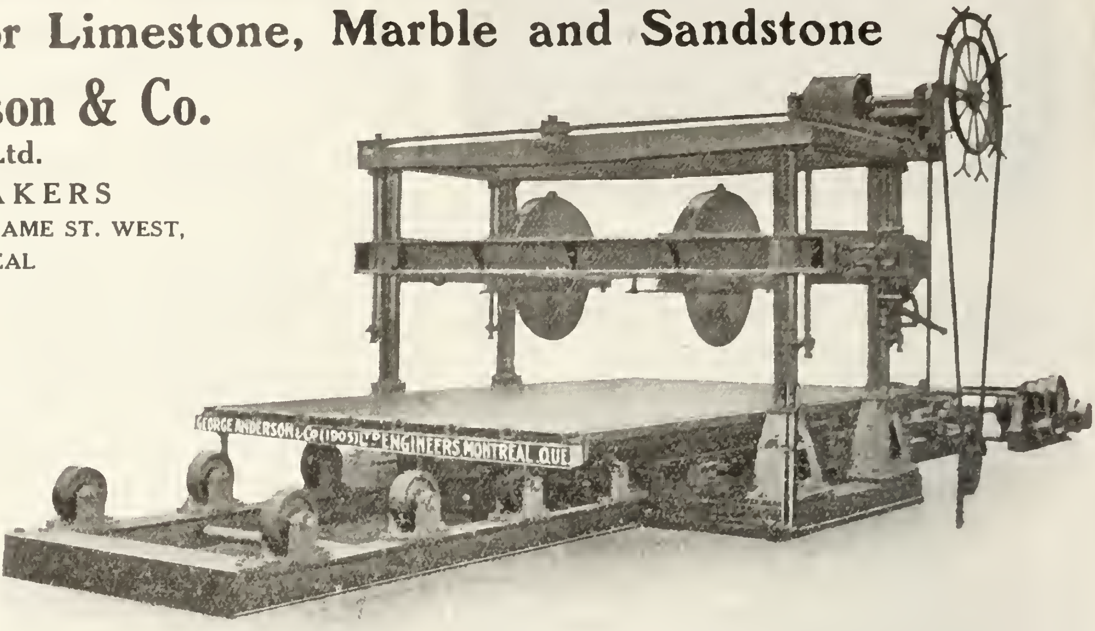

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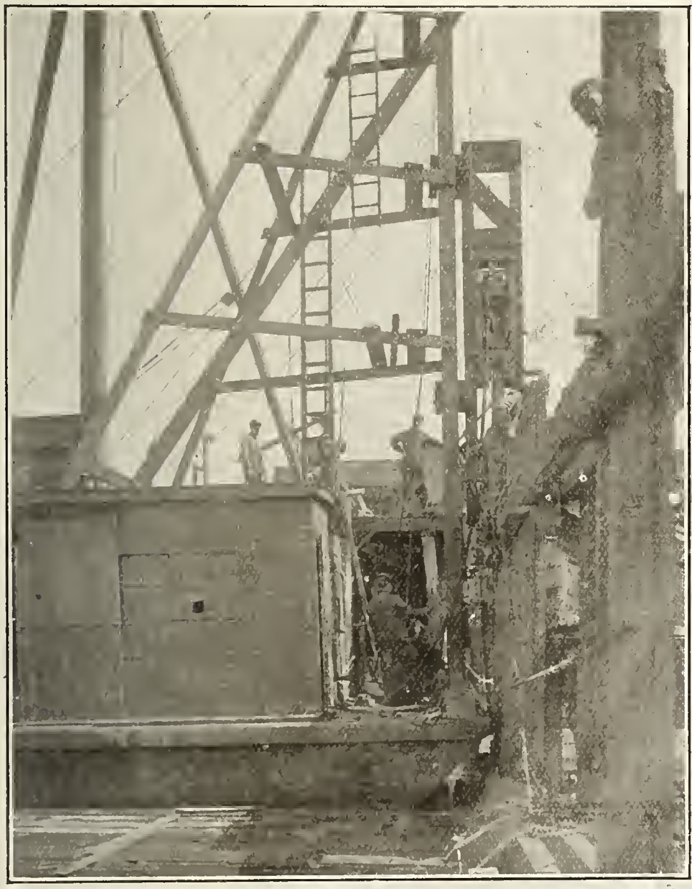

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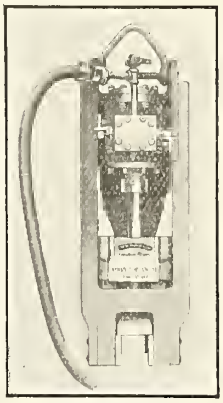

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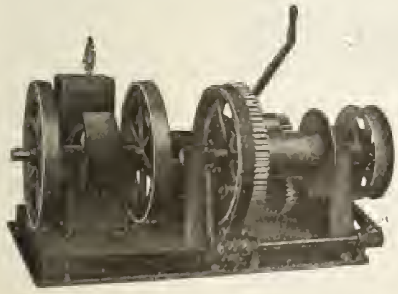

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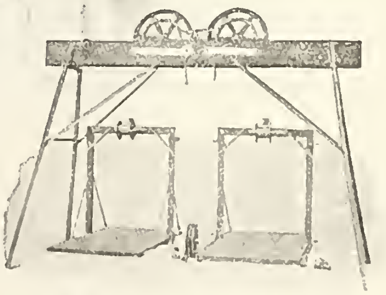

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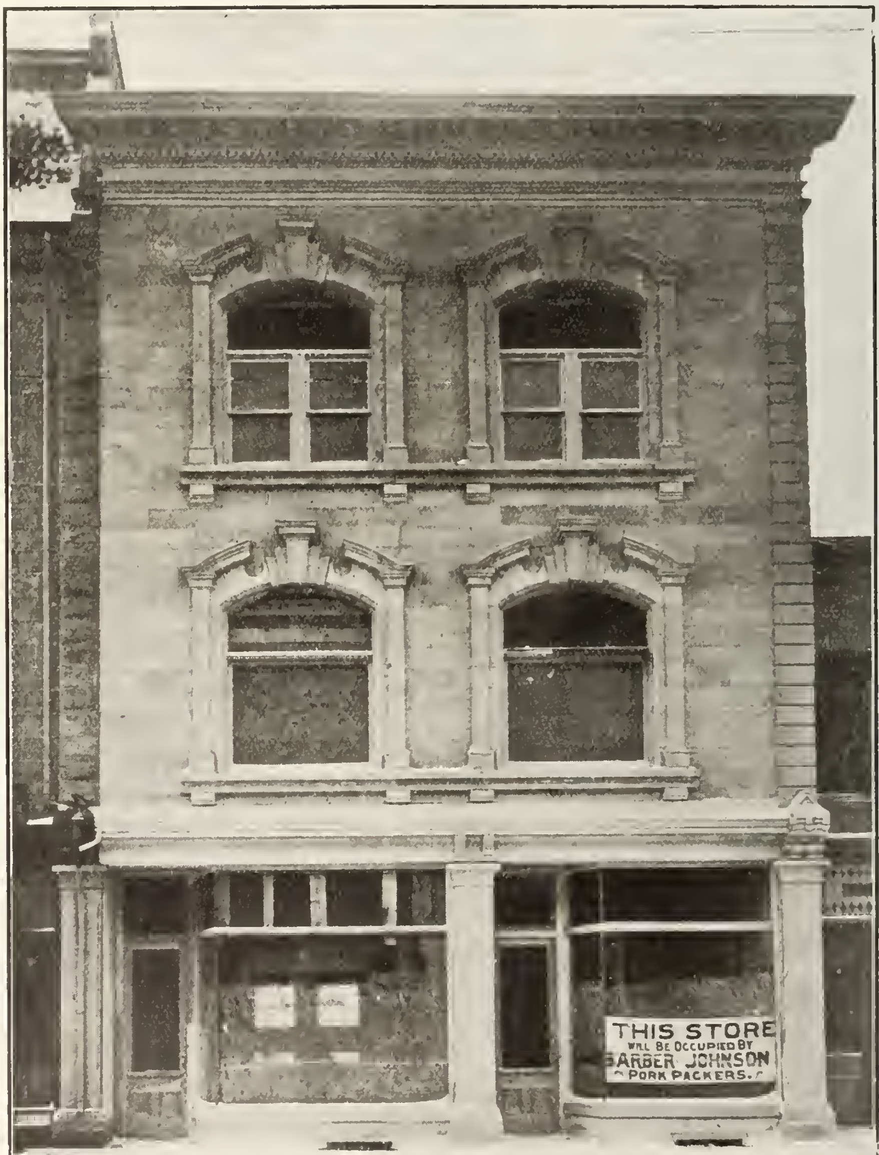

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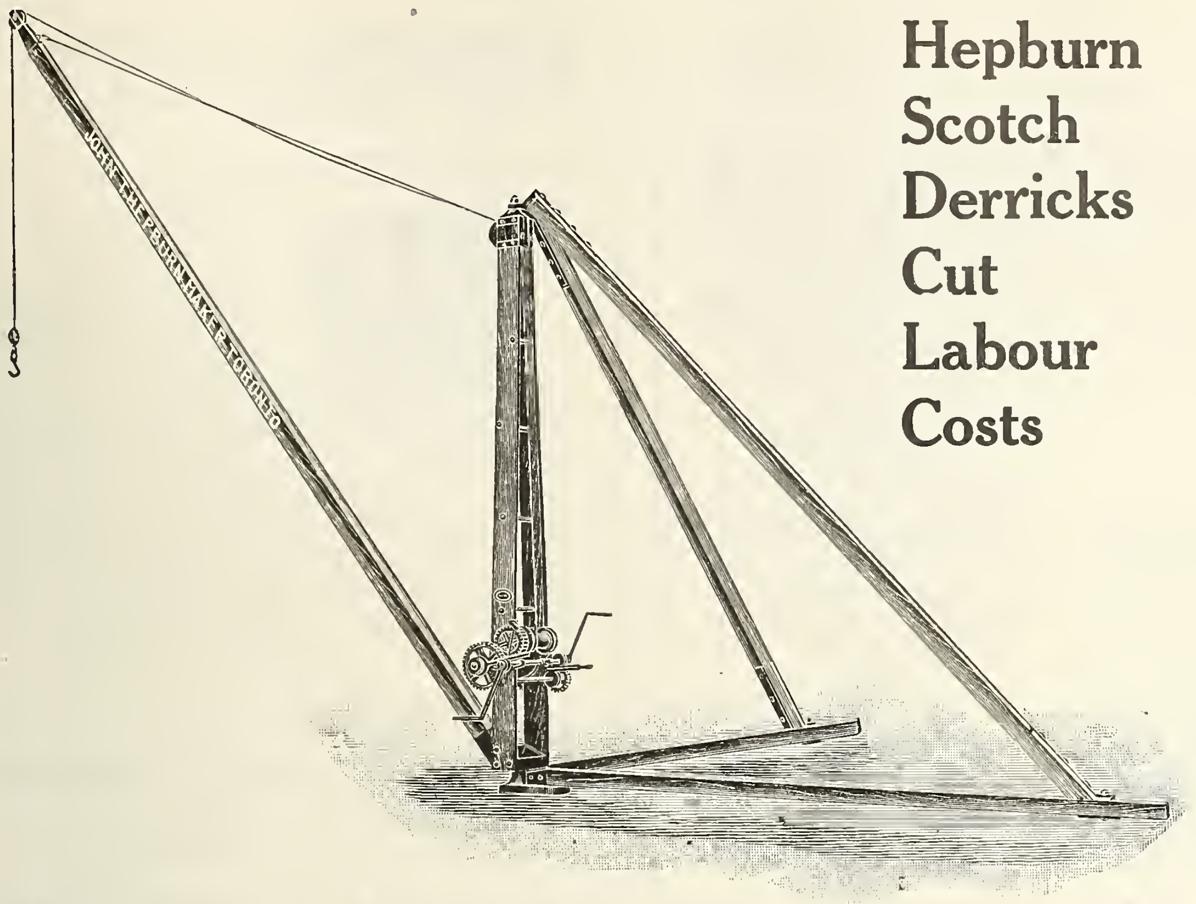
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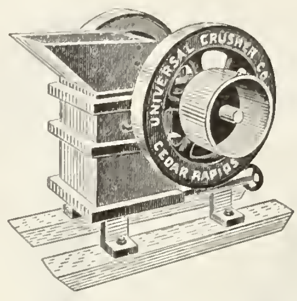

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Crushing, Elevating and Screening Machinery

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Exclusive representative of the famous CHAMPION Road and Street Machines.

No. 20 Champion Rock Crusher. Capacity 100-140 Tons per hour.

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Means Just This:

Accuracy, uninterrupted service, without frequent and expensive repairs and the application of the right principles of construction and operation to specific needs.

Let us tell you something of the efficiency of our Water Meters and the various types which we manufacture

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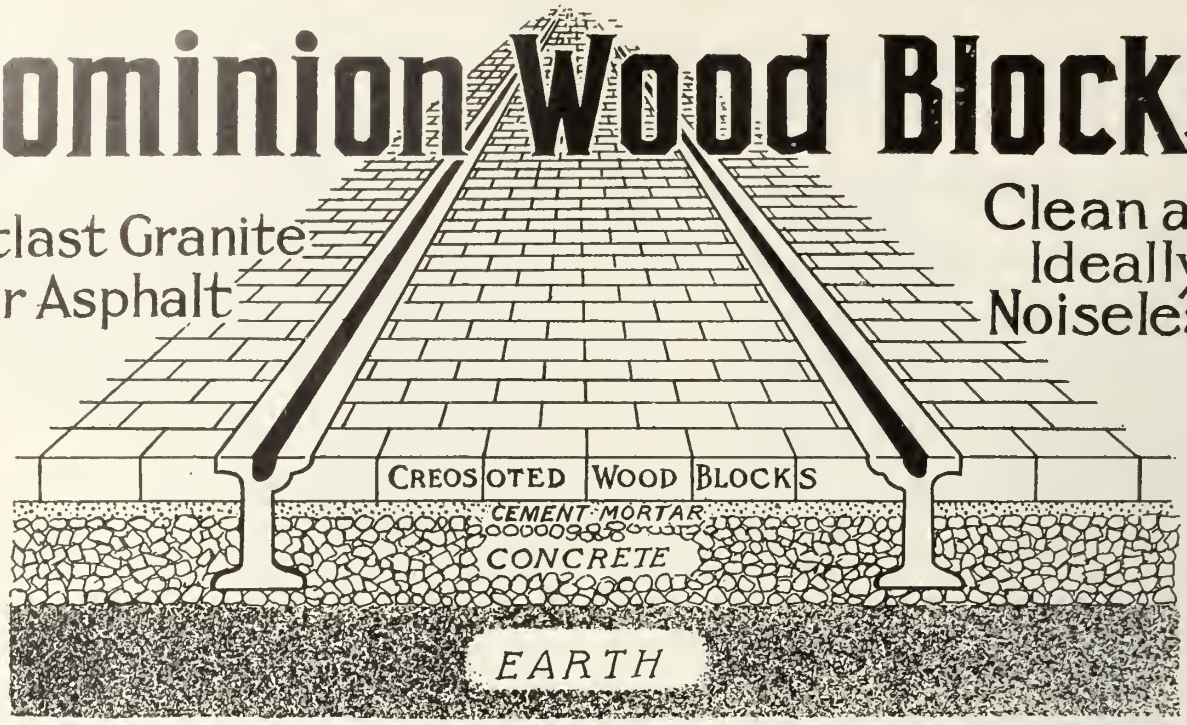

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May be in the eating; which seems also to suggest ease of early dissolution. The exact reverse applies to the PROOF OF A

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One that requires the constant attention of the Repair Gang to prevent its break-up and ruin could not be said to have proven satisfactory. Yet the Repair Gang seems to be an essential feature of Patent Pavements. ¶ How often have you seen the **Creosoted Wood Blocks, The Wood Eternal,** being PROVED IN THE PUDDING MANNER? ¶ Dominion Creosoted Wood Paving Blocks are cut from the log of live Douglas Fir in our own mills.

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OVERHEAD TRAVELLERS WORKED FROM ABOVE OR BELOW
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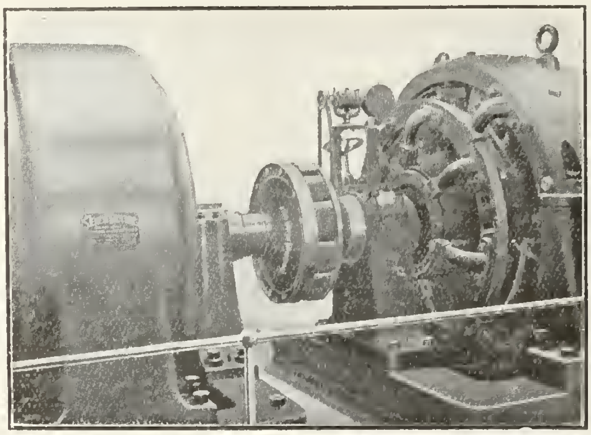

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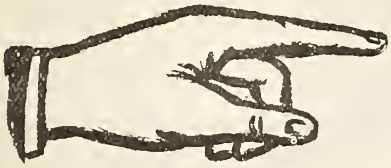

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Mr. City Official:

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The THEW SHOVEL has revolutionized the methods employed for cellar excavating, street grading, road construction, and light contract work in general.

The contractor whose equipment includes one of these light shovels, capable of doing the work of thirty or more laborers and economical if it replaces only four or five men, can underbid the contractor who is not so equipped. He can move a given yardage in a shorter time, at a lower cost, and with less trouble. He is recognized as up-to-date in his methods, is given an opportunity to figure upon the best jobs, and will usually receive the preference, other conditions being equal.

The THEW SHOVEL will handle cuts as shallow as 12 inches and give economical results. It will rip up old macadam and handle rough, stony ground most effectively.

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Manufacturers of **STEEL**

For Reinforcing Concrete.
Plain Rounds, Squares or Twisted Squares.
Cross Arm Braces, plain and galvanized.

ANGLES from ¾ x ¾ in. up to 2 x 2 ins.
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We can ship from stock

FLATS from ¾ in. up to 4 ins. in width, and other special sections.

Ask us for prices—they will interest you.

Office and Works : Sherman Ave., North

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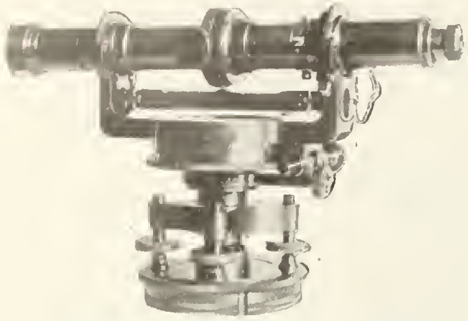

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Surpasses any instrument of its kind sold in Canada

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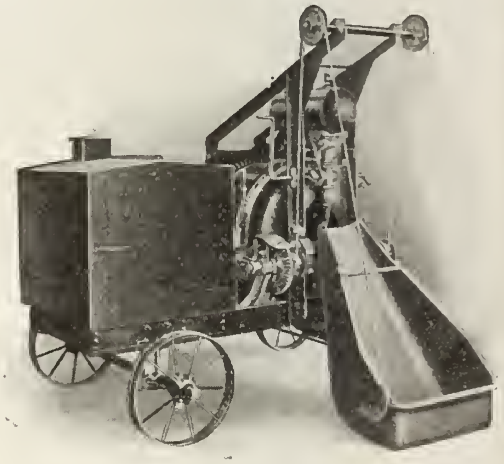
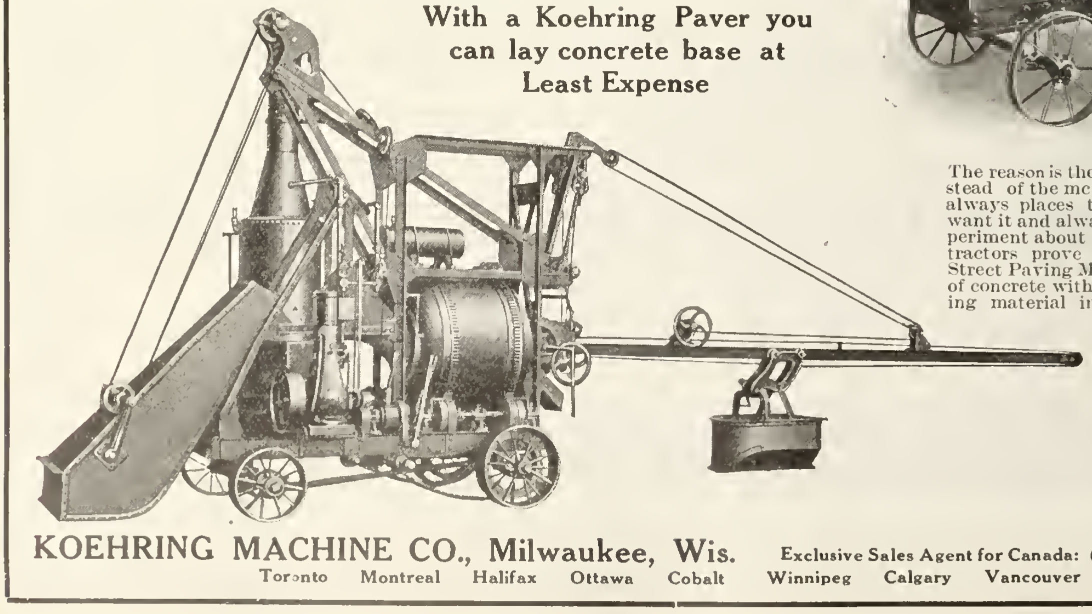
The Koehring 3 in 1 principle of mixing means three times as much mixing or an equal amount of mixing in one-third of the time. There are three independent and opposed mixing actions in the Koehring drum producing thoroughness of mixing and rapidity of mixing and a uniformity of mixing, no other Mixer equals. There are also equally important advantages in the mechanical construction of the Koehring Mixer.

The heavy cast special metal Koehring drum will outlast the drum of any other Mixer. The railroad truck bearing truss and the rollers being keyed on to the axle, makes "wabbly" drums impossible.

The charging bucket raises to a nearly vertical position so that all the material will pass into the drum without pounding the bucket. There are numerous other important features in the Koehring Mixer that you should know about.



With a Koehring Paver you can lay concrete base at Least Expense



The reason is the machine conveys the concrete instead of the men, and it's a dependable conveyor, always places the concrete exactly where you want it and always dumps clean. There is no experiment about it, the records of dozens of contractors prove the economy of the Koehring Street Paving Mixer and it combines this placing of concrete with a simple charging bucket for getting material into the drum in shortest possible time and least number of men, also, it has traction drive for moving the machine along the line of work and keeping close to the material pile. This builds contractors reputations and pays handsome profits. Aren't you interested in this reputation and profit making?

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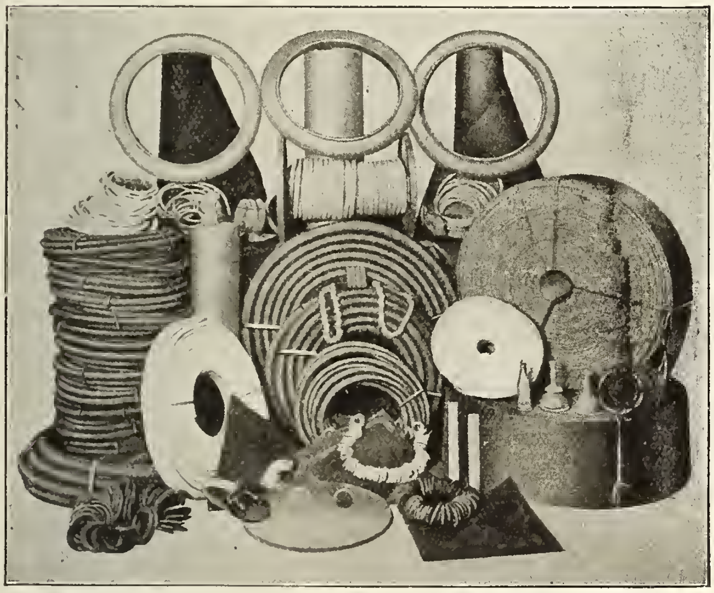
Heat and Oil-Resisting Steam Hose

You don't buy hose every day. When you **do** buy, it's up to you to remember that the **best** you can buy **to-day** is the **cheapest** you can use to-morrow—and demand

GOODYEAR

Steam and Hot Water Hose

Dependable Hose for Boiler Rooms



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This hose is **specially treated** to yield the maximum resistance to steam and **oil**—agencies that play havoc with other hose, **shortening its usefulness** and **doubling its cost.** The toughest, strongest, least-affected-by-heat hose in existence—and the most economical.

In addition to Goodyear Steam and Hot Water Hose, we also make highest grade

Fire Hose
Air Hose
Suction Hose

as well as special hose for

Oil, Gasoline, Vinegar, Fire Extinguishers
Brewers and Divers

If **ultimate saving** is worth your while, buy **Goodyear** Hose. In every foot you get the same high quality material, skillful workmanship and years of experience that have built such enduring service into the products of the Goodyear Tire & Rubber Company, Akron, Ohio, U.S.A.

Tell us what kind of hose you are interested in.

Let us quote you a **saving** price—and ship you **saving** goods.

Our sales of the last four months 50 per cent. greater than those of last year. Defective goods returned only $23.93.

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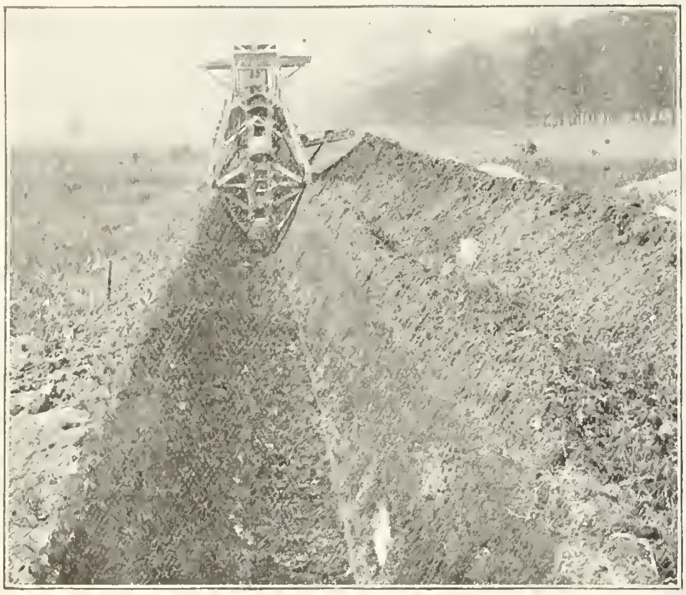
Combination Outfit for Digging

Open Main or Lateral Ditches and Trenches for Tile and Pipe Lines



No. 00	wheel	cuts	5 ft.	deep,	2 ft.	bottom,	10 ft.	deep
No. 0	"	"	5 ft.	"	4 ft.	"	14 ft.	"
No. 10	"	"	6 ft.	"	4 ft.	"	16 ft.	"

From six to nine feet a minute of sloping bank ditch can be dug with an **Austin Ditching Machine with Sloping-Bank Attachment.** The ditch and the ditcher are shown in the accompanying picture. No hand-dug, hand-trimmed ditch can excel this machine ditch in appearance or in accuracy of grade or section, and no hand-dug ditch can be constructed for twice the cost. As between one man with team and scrapers and another man with team and scrapers the possible difference in the cost of the work may be small, but it is great between one man with teams and scrapers and another man with an Austin Ditching Machine with Bank-sloping attachment.

When open ditches are finished and trenches are to be dug the wheel is removed, a digging boom put on, and the machine is used as shown in lower cut. The positively self-cleaning buckets make fast work possible in sticky soil. The entire outfit is mounted on caterpillar tractions which will not mire. You cannot mire nor can you clog an Austin Trenching Machine, and it is equally efficient in hard soil because of its strength and its rooter plow point buckets.

Motive Power Steam or Gasoline

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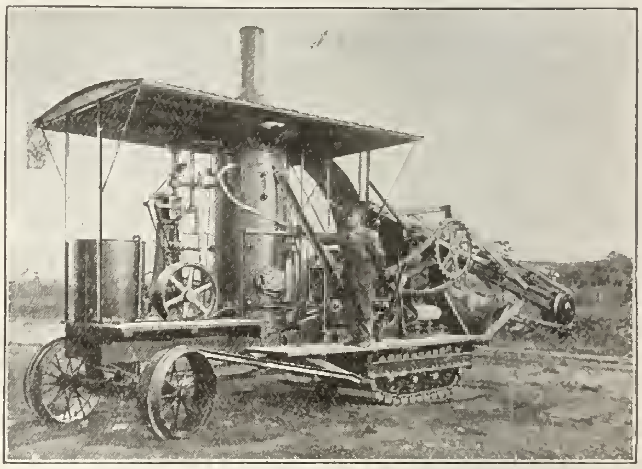

Makes trenches 15 in., 18 in. and 24 in. wide, maximum depth of 8 ft.

F. C. Austin Drainage Excavator Co.

Railway Exchange, CHICAGO, ILL.

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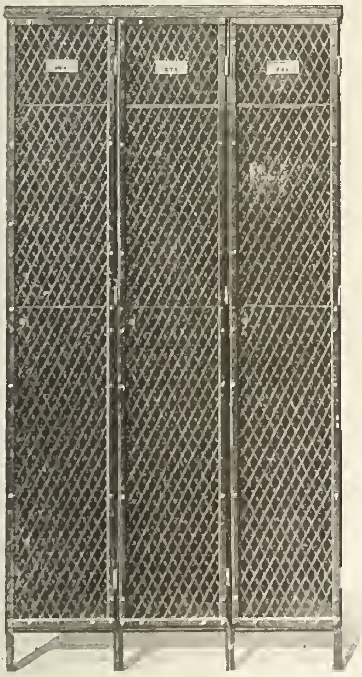
'Meadows' Metal Lockers



Make friends because of their substantial construction and unique features. We make several styles and sizes of these lockers. We'll know what you want if you just hint at your requirements.

Send for our interesting booklet entitled

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build on the KELLOGG system of construction are more permanent—of less cost and more economical in operation than any other known type.

We have many in successful operation throughout the Dominion and United States.

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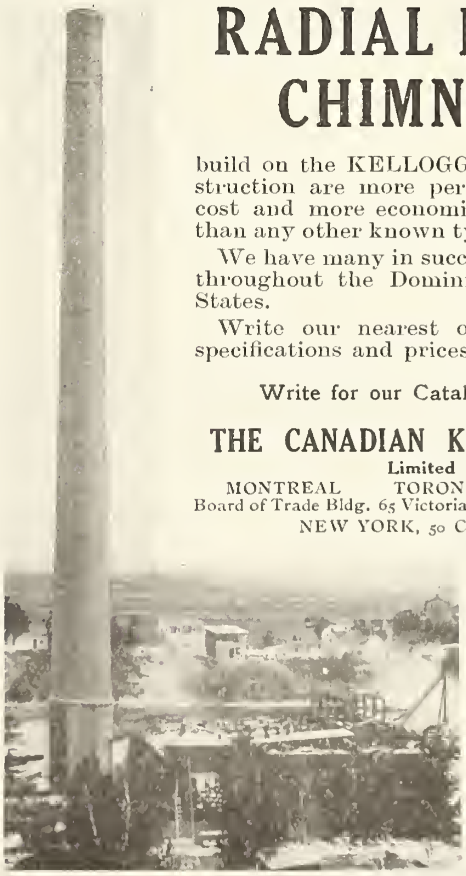

Height 250 ft. Top diameter inside 10 ft. built for Wayagamack Pulp & Paper Co'y, Three Rivers, Que.

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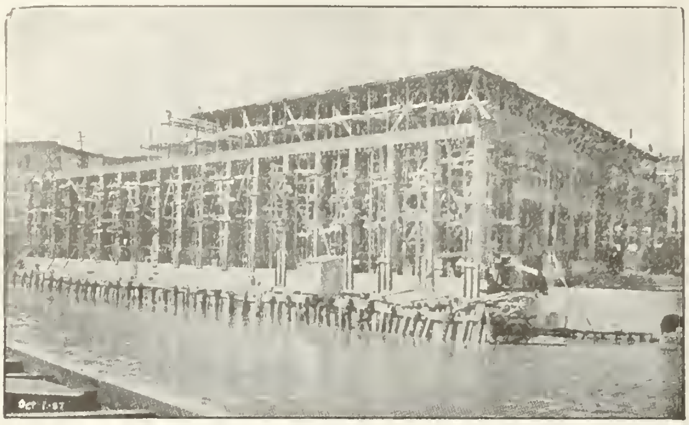
A dry powder, to be mixed dry with dry cement before sand and water are added, thus becoming a part of the concrete.



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Alphabetical Index of Advertisers
Page 16

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The Engineer in the Court of Law

In an address given before the Engineers' Club of Toronto in December last, the Hon. Mr. Justice Riddell made some extended observations upon the training of the engineer in relation to the court of law. The particular point emphasized was that the habits of carefulness and accuracy engendered by the early training of the engineer should combine in the natural order of things to make him the best of expert witnesses. Unhappily it has been the experience of Mr. Justice Riddell and other legal luminaries that the engineer is often found lacking in the witness box; that he displays on some occasions more or less incompetency, and on others a tendency to misrepresent things.

Now the engineer is frequently called upon to give evidence in the courts and his position as an expert witness is worthy of consideration. In the first place it is hardly necessary to say that the first desire of the witness should be to render service to the judge and jury. He should do all he can to combat the impression that he has allowed a desire for his side to win to warp his conscience. The first duty of the expert witness should be to place himself in a correct position with the court. His knowledge of technical matters, his ability to fence in cross-examination, his clear explanations, will have little weight if his testimony makes it apparent that he is really an advocate of his own side. In the most sensational and bitterly contested cases, where the dispute turned almost entirely on expert evidence, it has frequently occurred that the experts for the plaintiff contradict and are flatly contradicted by the experts for the defendant. This kind of expert evidence has made the judges disgusted with the expert. It is the duty of the counsel to handle the case, and not the business of the expert witness to act as advocate. The expert witness should give prompt and clear answers, even if they appear to damage his client's case. It is the duty of the lawyer to explain it in a way to get round it if he considers the answer is likely to weaken his case. The expert should previously clearly understand the case, or the main facts of it, and, having formulated his opinions, should communicate with his client, and if unable to support a particular view, should say so. In giving evidence he should not presume that the solicitor is without some scientific and technical knowledge. The legal gentlemen employed on such cases have usually a good store of such information (Hon. Mr. Justice Riddell, for instance), and if they are ignorant on any point are not shy about confessing it.

In process of evidence the introduction of models and drawings frequently makes it easier for both judge and jury to grasp the main points of the case. Long, rambling answers do more harm than good, and, if admissions are necessary, let them be candid, without any attempt to fence. As a general rule, the witness is not expected to read his documents, but when the array of facts and figures is large and it is impossible for him to carry them in his head, he should commit them to writing, and when before the tribunal will be permitted to refresh his memory if he is prepared to swear that the notes are the result of actual observation noted when he was making his examination.

One of the difficulties an expert engineer has to face is text-books or writings, where the opinions of the authors, living or dead, appear to strengthen his opponent's case. By watching carefully while the case proceeds he may be able to discover the names of the works with which he is likely to be confronted, and, upon examination, may find it to be antiquated, or even an old edition, and in a more recent issue the author may have expressed an entirely different opinion. It is a good thing for expert witnesses to keep their books of reference from public gaze. An expert witness should not be too thin-skinned. A violent attack from the opponent's counsel should be considered as a compliment. It is quite apparent that the examiner considers his evidence has made an impression, otherwise he would not attack it.

In the matter of fees he should arrange the amount beforehand, and be careful to stipulate that so much be paid down and so much per day as the trial progresses. There are, unfortunately, some members of the legal profession who, when they have lost a case, are, to say the least, careless in the matter of fees. When the case has been won generous fees are allowed the successful client, and the expert witness should see to it that he receives his share. But above all, he must adopt a high standard in reference to matters about which there is no doubt.

The Quebec Bridge Contract

In defence of the award of the Quebec bridge contract to the St. Lawrence Bridge Company in face of the inequality of conditions experienced by a British concern, the Hon. Geo. P. Graham, formerly Minister of Railways, stated that the responsibility lay entirely with the Board of Engineers, whose advice he had taken throughout. Mr. Graham said that he had no apologies to offer for having followed the advice of the Board and that if the opportunity occurred again he would still be in favor of giving the work to a Canadian firm, "so that the money might be expended among Canadian workmen."

Such an explanation as this is an unsavory advertisement for Canada in British contracting circles. The only mitigating circumstance is that the Government of which the Hon. G. P. Graham was formerly a member has ceased to exist.

"Financial Costs" that Frequently are Under-Estimated

It is rare that an engineer's estimate of the cost of a project contains an adequate allowance for what may be called "financial costs." In fact, even the most self-evident of these "financial costs," interest during construction, is often omitted from cost estimates. Sometimes such omissions are purposely made by engineers, especially when it is known that the owners or promoters will themselves make an estimate of the "financial costs." We question, however, whether it is ever wise for an engineer to omit any element of cost that he is capable of making, unless he is specifically instructed to return an estimate of the physical property only.

What are the "financial costs" of a project? They may be classified as follows:

1. Organization cost; i.e., legal and administrative costs (other than engineering and superintendence), general office expenses, etc.
2. Taxes during the construction period.
2. Brokerage fee or discount involved in marketing securities.
4. Interest on the capital tied up during the construction period.
5. Development cost (being the sequel to interest during construction) or the accumulated deficit below a "fair return" on the invested capital up to the time that a "fair return" begins to me earned.

This last element of "financial cost" is one whose existence has always been recognized by experienced promoters, but one that, until quite recently, has never appeared in any engineer's estimate that we have seen. Yet failure to provide capital with which to meet the development cost of a project has been the cause of innumerable receiverships.

During the past year we have published several articles discussing the development cost, or "going value," of public utilities, such as railways; and the method of deducing the development cost by the aid of the ledgers of a company has been illustrated by several examples. It may be added that the writer has appraised the property of about a dozen public utility companies within the last year, and has deduced the development cost in each case. It is rare that the development cost has been less than 25 per cent. of the cost of the physical plant.

In an interesting article, Mr. Norman E. Webster, Jr., discusses "Methods of Financing Irrigation Developments." Mr. Webster gives estimates of the "financial costs" of irrigation projects, expressed as percentages of the physical plant. The following is a summary of his estimate of these cost items:

	Per cent.
Organization and promotion	10
General administration	10
Interest and development cost	21 to 30
Total, exclusive of bond discount	41 to 50

Mr. Webster does not use the expression development cost, but classes it under interest lost on the investment up to the time that the property begins to make sufficient net earnings to meet the interest charges. He estimates 6 per cent. per annum on the entire cost of the plant for a period of 3½ to 5 years, making a total of 21 to 30 per cent. to cover the interest lost on the investment. He also points out that all the bonds must usually be sold in advance of the first construction work, which results in a long nonremunerative period. For the comparative purposes the following percentages used by the writer in recent estimates of electric railway properties may be of interest.

Engineering and supt. (5%) and business administration (5%)	10
Legal, taxes and other general expenses	1½
Interest during construction	5
Brokerage fee (cost of selling bonds)	5
Development cost	30

Calling the cost of the physical plant unity (1), we have the following:

	Cost
Physical plant (incl. 5% for contingencies)	1.000
Add eng. supt. and adm. (11½%)	0.115
Total	1.115
Add 5% of 1.115 for interest	0.056
Total	1.171
Add 5% of 1.171 for brokerage	0.059
Total	1.230
Add 30% of 1.23 for development cost	0.369
Grand total	1.599

It is difficult for some people to look upon the development cost—the accumulated deficit below a fair return on the investment—as being a real cost. They argue that a deficit can not be a source of value, but is the reverse. Yet, curiously enough, they concede that interest during construction is an element of the cost of a property. When it is pointed out that the development cost is merely a sequel to interest during construction, it becomes more apparent that the development cost is an essential element of the cost of the going concern.

Can a deficit be a cause of value? Yes, if it is not a deficit that connotes a permanent loss. A deficit arising from a fire or a burglary can not be an asset in the absence of insurance. But a deficit arising from a necessary expenditure, either to create a physical plant or to create the business of a going concern, is a wholly different sort of deficit. Such a deficit is, in fact, an investment, which, in all probability, will ultimately yield an adequate return if the project is one that is well managed and is not begun too far ahead of the times. Perhaps no better example can be found to illustrate the confusion that a word can cause than is to be found in this word deficit. Since deficit often denotes a permanent loss, it impresses the mind that there is an incongruity in the argument that any deficit can be the measure of an asset. The word deficit is merely a symbol to denote an outlay of cash. If the outlay is irrecoverable—as in the case of loss of uninsured property by fire—the deficit decreases the assets. But if the outlay is recoverable—as in the case of money reasonably spent for advertising an article or promoting an irrigation project—the deficit increases the assets.

Honest promoters never incur temporary deficits in fair return upon their investments without belief in the ultimate recovery of the deficits. But many an honest promoter is too sanguine as to the short duration of the deficit period—the development period. It is clearly the function of the modern engineer to study the development cost of all sorts of projects of an engineering nature, with a view to estimating development costs with some degree of accuracy. Protection of his clients, and of the public whom his clients seek to interest in a project, should be the prime consideration of every engineer who is called upon to design a plant and estimate the cost. Full protection can only be given by a correct and full estimate of cost up to the time that the project will begin to yield an adequate return on the invested capital.—Engineering & Contracting.

Effect of Quality of Foremen on Construction Costs

THE amount of work performed by a laborer who is working by the day does not necessarily vary with the amount of his wages, says Fred Taylor in his work on "Concrete Costs." In general, if a man is paid less than the average wage in the section of the country where he is employed he will do less than an average day's work. If paid higher than the average wage, he will do a large day's work. But when paid the average local wages, if these fluctuate from year to year, the laborers will generally do less work in the periods of higher prices than when lower prices prevail, because high prices in a fluctuating market are apt to be the result of scarcity of labor and men are therefore independent. If working by the day they cannot be hurried, because if discharged they can easily get another job. In busy times, therefore, a contractor frequently must not only pay higher rates of wages, but he receives, at the same time, less returns for a day's payment. The excess cost due to this cause can be estimated approximately by judgment by an experienced contractor or engineer.

The physical ability of men is a variable which is apt to average itself, except when labor is scarce and it is necessary to employ men unsuited for the work in hand—another disadvantage to the contractor who is paying high wages in busy times.

The temperature may affect the amount of work performed. On a very hot day men are apt to do less work than when the temperature is moderate. This variable need not be considered except on short jobs performed in exceptional weather.

The quality of the foreman on a construction job under the ordinary type of management produces an astonishing effect on the amount of work accomplished by men on day wages. In certain cases that have come under the observation of the authors, men have accomplished 50 per cent. more work in a given time under a first-class foreman than similar men working under exactly the same conditions with a poor foreman over them. This dependence of the contractor upon his foreman (and it is not by any means confined to construction work, but is just as much in evidence in old-fashioned factory methods) illustrates the great need of some system of management which will eliminate the variation in cost due to this cause.

Letters to the Editor

Uniformity of Distribution in Sewage Filtration

York, Eng., March 7, 1912

Editor Contract Record:

We have read with interest your article on page 44 of your Feb. 21 issue, on the tests made on the Andover Filter by Mr. Clarke, of the Massachusetts State Board of Health.

The area of this filter was 1/200 of an acre, or, say, 24.2 yards, which gives a diameter of, say, 5.5 yards. We should have said this was too small to test the comparative values of distributing apparatus, but taking the tests as given, the report states that in 1907 and 1908 the tank liquor was distributed upon the filter by means of dash plates (or sprays), and that the effluent contained nitrates 0.01 and 0.57 parts per 100,000 respectively. The liquor was put on at the following rates: 24 per cent. at rates from 50,000 to 1,000,000 gallons per acre = 10.3 gallons per yard say to 200 gallons per yard; 17 per cent. at rates from 1,000,000 to 2,000,000 gallons per acre = 200 gallons to 400 gallons per yard; 20 per cent. at rates from 2,000,000 to 4,000,000 gallons per acre = 400 gallons to 800 gallons per yard; and the remaining 16 per cent. at rates from 4,000,000 to 7,500,000 gallons per acre = 800 gallons to 1550 gallons per yard. There is a discrepancy here, as the total volume is not accounted for.

In April 1909, a paddle type distributor was installed which delivered liquor to the filter as follows: about half of the surface received it at the intended rate, i.e., between 1,000,000 and 2,000,000 gallons per acre per day—or from 200 gallons to 400 gallons per yard, whilst a quarter received less than 1,000,000 gallons per acre—or less than 200 gallons per yard of surface. The balance of the area received it at a greater rate than 2,000,000 gallons per acre—or more than 400 gallons per yard. The highest rate on any portion with this distributor was only 2,250,000 gallons per acre, or say 460 gallons per yard,—about half the maximum rate at which the sewage was applied on the dash plate system.

Immediately following the installation of the rotary distributor, nitrification increased,—the average nitrates in the effluent during the following six weeks being 0.69 parts per 100,000, a result higher than anything previously obtained. The nitrates in the effluent averaged 1.09 parts per 100,000 in the summer of 1909 and 1.69 during the summer of 1910 . . . . "This improvement must be due to the improvements in the uniformity of delivery."

The Derbyshire County Council says that an effluent which contains less than 1 part per 100,000 of albuminoid ammonia, and which contains more than .5 parts per 100,000 of nitrogen as nitrates is a good effluent, so that in 1907 the effluent from dash plates (with nitrates 0.01) was bad. In 1908 the effluent 0.57 was good.

If we take the analysis as that from the average sample and volume put upon the filter, it would be the analysis of the effluent passed through a percolating filter, having a depth of 7 ft. 6 in., at the rate of 2,942,500 gallons per acre, or 624 gallons per yard. We have not the analysis of the sewage, so we cannot see what percentage of purification has been obtained in either case, but the analysis given of the effluent shows that the filters were overworked prior to the installation of the paddle type, and that this distributor delivered a greatly reduced volume to the bed (an average only of 1,550,000 gallons per acre, or 320 gallons per yard—about half the former volume) with the result that the effluent was much improved because the less volume allowed of greater oxidation, and the consequent increased formation of nitrates.

With the Dash Plate (or fixed spray) system, the whole filter surface was continually wetted, and without rest, so that the oxidation necessary could not take place. With the paddle driven, or any type of revolving distributor, the delivery of the water to the surface is momentary, as it travels, and the long interval of rest which is so beneficial to the filter produces the better effluent, and the formation of nitrates whilst the filter is at rest. The more uniform the delivery, the better the effluent will be. It has already been said that with this particular distributor, about half the surface received sewage at approximately the intended rate, the variation in volume distributed over various parts of the filter being from 1,000,000 to 2,000,000 gallons per acre (200 to 400 gallons per yard) up to 2,250,000 gallons per acre, or 460 gallons per yard, the average rate being 1,550,000 gallons per acre—320 gallons per yard, or about one-half of the volume sprayed upon the filter by the dash plates. So that the latter were working at a double disadvantage: (1) they worked continuously wetting the whole surface, and giving the filter no breathing space; (2) they put on a volume about twice as great as that delivered by the paddle wheel type. (We should have expected a more marked difference.)

We believe that the working of the paddle wheel type has demonstrated the value of even and intermittent distribution, and that whilst it gives the later, it frequently fails in the former, because of the difficulty of keeping it dead level. It is here that the advantage of a spray driven distributor comes in, because it actually delivers the same volume on each super yard, and the delivery is in a spray.

To those of your readers who are interested in this subject, the above notes may be helpful. We have had to assume certain conditions as to the manner of working the dash plates.

Yours obediently,
S. H. ADAMS,
(Assoc. Mem. Inst. Civil Engineers),
Managing Director of Adams-Hydraulics, Ltd.

Only rarely is the method of tree-felling applied to the razing of a chimney. An instance, however, occurred in the case of a chimney which was originally part of the Brush electric plant in Cleveland, Ohio. This stack was 10 feet square at the base, and 100 feet high, and was built of common brick, lined with firebrick and topped out with a cast-iron cap. The method of throwing this stack was quite similar to the cutting down of a large tree. Brickwork on the south side of the stack was cut out, extreme care being taken to make the cutting symmetrical on each side of the center line of the stack. The cutting was continued until the weight of the stack began to crush the brickwork at the edge of the cut. As soon as this occurred, the stack, of course, fell to the south. So accurately was the work done that the fallen stack lay exactly parallel with the sidewalk, as was intended. The outer shell of the stack crushed downward, while the inner lining maintained its original shape until the falling stack struck the ground.

The Ethics of Consulting Engineering and Standard Fees for Consulting Service

A code of ethics and a schedule of fees to govern their services were adopted last June by the American Institute of Consulting Engineers. These rules and figures were the result of careful consideration in committee and by the society as a body. Recently the Pacific Association of Consulting Engineers was organized and according to announcements just received has an initial membership of 22 engineers. The association has also formulated a code of ethics and a schedule of fees, both of which are based upon the corresponding documents of the American Institute of Consulting Engineers, but both of which are original in many particulars. These two codes and schedules are published by our Chicago contemporary, Engineering & Contracting, which rightly opines that they will be of interest as indicating what leading engineers consider to be good ethical procedure and fair compensation for engineering services of expert character.

American Institute of Consulting Engineers

Code of Ethics.—It shall be considered unprofessional and inconsistent with honorable and dignified bearing for any member of The American Institute of Consulting Engineers

(1) To act for his clients in professional matters otherwise than in a strictly fiduciary manner or to accept any other remuneration than his direct charges for services rendered his clients, except as provided in Clause 4.

(2) To accept any trade commissions, discounts, allowances, or any indirect profit or consideration in connection with any work which he is engaged to design or to superintend, or in connection with any professional business which may be entrusted to him.

(3) To neglect informing his clients of any business connections, interests or circumstances which may be deemed as influencing his judgment or the quality of his services to his clients.

(4) To receive, directly or indirectly, any royalty, gratuity or commission on any patented or protected article or process used in work upon which he is retained by his clients, unless and until receipt of such royalty, gratuity or commission has been authorized in writing by his clients.

(5) To offer commissions or otherwise improperly solicit professional work either directly or by an agent.

(6) To attempt to injure falsely or maliciously, directly or indirectly, the professional reputation, prospects or business of a fellow engineer.

(7) To accept employment by a client while the claim for compensation or damages, or both, of a fellow engineer previously employed by the same client and whose employment has been terminated, remains unsatisfied or until such claim has been referred to arbitration or issue has been joined at law or unless the engineer previously employed has neglected to press his claim legally.

(8) To attempt to supplant a fellow engineer after definite steps have been taken towards his employment.

(9) To compete with a fellow engineer for employment on the basis of professional charges by reducing his usual charges and attempting to underbid after being informed of the charges of his competitor.

(10) To accept any engagement to review the work of a fellow engineer for the same client, except with the knowledge or consent of such engineer or unless the connection

of such engineer with the work has been terminated.

Schedule of Fees.—As a general guide in determining fees for professional services, The American Institute of Consulting Engineers recognizes the propriety of charging: A per diem rate; a fixed sum; or a percentage on the cost of work; as follows:

Per Diem Rate: (1) Charges for consultations, reports and opinions vary according to the character, magnitude and importance of the work or subject involved and according to the experience and reputation of the individual engineer, from $100 per day to a higher figure, and in addition where expert testimony is required or where otherwise conditions warrant so doing, a retainer varying from $250 to $1,000 and upwards. An additional charge should be made for all actual expenses such as traveling and general office expenses and field assistants and materials, with a suitable allowance for indeterminate items. In such cases six hours of actual work should be considered one day, except that while absent from the home city each day of 24 hours or part thereof should be considered one day, irrespective of the actual hours of time devoted to the case.

Fixed Sum: (2) A fixed total sum for above mentioned services may be agreed on in lieu of per diem charges. A fixed sum may also be charged for a portion or all of the items of preliminary surveys, studies, examinations, reports, detail plans, specifications and supervision, including all of the expenses above recited under per diem rate.

Percentages on the Cost of Work: (3) For preliminary surveys, studies and report on original project, or for examinations and report on project prepared by another engineer, including in both cases all expenses of every nature except those that may be specially omitted by agreement—from 1½ to 3 per cent. on the estimated cost of the work.

(4) For the preliminary stage (3) and in addition thereto detail plans and specifications for construction, including all expenses of every nature except those that may be specifically omitted by agreement—from 2½ to 5 per cent. on the estimated cost of the work.

(5) For the preliminary and middle stages (3) and (4) and in addition thereto general supervision during construction, including all expenses of every nature except those that may be specifically omitted by agreement—5 per cent., but more for work costing comparatively small amounts, and from 4 to 5 per cent. where the amount involved is considerable.

(6) For full professional services (3), (4) and (5) and management, including the awarding of contracts, and including all expenses of every nature except those that may be specifically omitted by agreement, 10 per cent., but more for work costing comparatively small amounts, and 6 to 10 per cent. where the amount involved is considerable.

(7) When desired, the percentage basis may be adopted for one or more stages, supplemented by a daily or monthly charge or fixed sum for the remaining stage or stages.

General Provisions: (8) The period of time should be designated during which the agreed percentages and daily or monthly charges or fixed sum shall apply and beyond which period an additional charge shall be made.

(9) The percentages are to be computed on the entire cost of the completed work or upon the estimated cost, pending execution or completion.

(10) Payments shall be made to the engineer from time to time in proportion to the amount of work done.

(11) When alterations or additions are made to contracts, drawings or specifications, or when services are required in connection with negotiations, legal proceedings, failure of contractors, franchises or right-of-way, a charge based upon the time and trouble involved shall be made in addition to the percentage fee agreed upon.

Pacific Association of Consulting Engineers

Code of Ethics.—It shall be considered unprofessional and inconsistent with honorable and dignified bearing for any member of the Pacific Association of Consulting Engineers

(a) To act for his clients in professional matters otherwise than a strictly fiduciary manner, or to accept any other remuneration than his direct charges for services rendered his clients, except as provided in Clause (d).

(b) To accept any trade commissions, discounts, allowances or any direct profit or consideration in connection with any work which he is engaged to design or to superintend, or in connection with any professional business which may be entrusted to him save with the full knowledge and consent of his client.

(c) To neglect informing his clients of any business connections, interests or circumstances which may be deemed as influencing his judgmentment or the quality of his services to his clients.

(d) To receive directly or indirectly any royalty, gratuity or commission on any patented or protected article or process used in work upon which he is retained by his clients, unless prior to the use of the same he shall have notified his clients that he is entitled to such royalty, gratuity or commission.

(e) To offer commissions or otherwise improperly solicit professional work either directly or by an agent.

(f) To attempt to injure falsely or maliciously, directly or indirectly, the professional reputation, prospects or business of a fellow engineer.

(g) To accept employment by a client while the claim for compensation or damages, or both, of a fellow member previously employed by the same client and whose employment has been terminated, remains unsatisfied ,or until such claim has been referred to arbitration, or issue has been joined at law, or unless the member previously employed has neglected to press his claim legally, excepting with the written consent of the fellow member.

(h) To attempt to supplant a fellow engineer after definite steps have been taken towards his employment.

(i) To compete with a fellow engineer for employment on the basis of professional charges, by reducing his usual charges and attempting to underbid after being informed of the charges named by his competitor.

(j) To accept any engagement to review the work of a fellow member for the same client, except with the knowledge of such member, unless the connection of such member with the work has been terminated.

(2) For the purpose of improving present practice, and for the purpose of increasing the efficiency of the engineering profession as an aid to the settlement of questions in controversy, this association believes it desirable to restrict such engagements as soon as practicable to the following conditions.

(a) As a witness when appointed by and compensated through the agency of the court.

(b) As court commissioner, referee or other examiner, preferably sitting with an attorney, to take evidence involving engineering questions.

(c) As arbitrator appointed by either party to the controversy, or by both parties jointly through the agency of the court or otherwise, and compensated by both parties conjointly.

(d) As special advisor to either contestant .

This association advocates the early adoption of such changes in the methods of court procedure.

(3) Members are to have the right at any time to receive from the Board of Governors an interpretation of this code of ethics in application to difficult and unusual cases.

Schedule of Fees.—As a general guide in determining [illegible] for professional services, the Pacific Association of Consulting Engineers recognizes the propriety of charging: (a) A per diem rate; (b) A fixed sum; (c) A percentage on the cost of work.

A—Per Diem Rate.—Charges for consultation, reports and opinions should vary according to the character, magnitude and importance of the work or subject involved, and according to the experience and reputation of the individual engineer, from $50 per day to a higher figure; and in addition, where conditions warrant, a suitable retainer. An additional charge is to be made for all actual expenses such as surveys, traveling and general office expenses.

B—Fixed Sum.—A fixed total sum for the above mentioned services may be agreed on in lieu of per diem charges.

C—Percentages on Cost of Work.—(1) For making preliminary studies, working drawings, specifications and contracts and for the general direction and supervision of the work, in lieu of a per diem or a fixed sum the minimum charge shall be five (5) per cent. upon the entire cost of the work, exclusive of legal and administration costs.

(2) For work costing less than $20,000 or of unusual complicity of design, it is proper to charge a special fee in excess of the above.

(3) Consultation fees for professional advice are to be the subject of special agreement.

(4) Payments to the engineer are due as his work progresses; upon completion of the preliminary design of an original project or for the examination and report upon a project prepared by another engineer, one-fifth (1/5) of the entire fee; upon completion of working drawings and specifications, two-fifths (2/5); the remaining two-fifths (2/5) being due from time to time in proportion to the work done at the office or at the site.

General Provisions.—(1) Until the actual cost of work is determined, the charges shall be based upon the estimated cost.

(2) Necessary traveling expenses shall be paid by the owner.

(3) Changes in plans and specifications ordered by the owner shall be paid for by the owner; the additional fee to be based upon the amount of the cost involved in the change.

(4) All chemical, physical and mechanical tests, examination of sites, etc., are to be paid for by the owner.

(5) In case of abandonment or suspension of the work at any time, an adjustment of the fee shall be made on the same basis as that of the partial payments hereinbefore stated.

(6) If any material or work used in the construction of the project be already upon the ground or come into the owner's possession without expense to him, its value shall be included in making up the total amount upon which the fee is determined.

(7) It is recognized that in any work undertaken by an engineer there may be problems requiring the services of a specialist. The cost of such special assistance shall be paid by the owner.

(8) Contract forms shall, when requested, be prepared by the engineer; but all legal services connected therewith, together with all services, legal or otherwise, incidental to purchase of rights of way, failure of contractors, disputed contracts and work of such order shall be paid for by the owner. The engineer shall render all necessary assistance in the way of explanation of his work.

(9) It is recognized that engineers may with propriety undertake all the work in connection with a project including business, legal and other matters, in which case the fee shall be the subject of special agreement.

The distinguishing feature of the Pacific Association's code of ethics compared with the older code on which it is based, is the provisions embodied to establish better procedure in the service of engineers as expert witnesses before the courts. Briefly, it is proposed that the engineer shall in no case act as expert witness under pay by one of the contestants. He may serve as advisor to a contestant or as expert witness or commissioner appointed by the court or as arbitrator appointed by contestants or court and compensated by both contestants conjointly.

Permanent Structures*

By James A. Bell, C. E.

PERMANENT structures as applied to municipal public works are those structures which, when properly built, will remain and fulfil the requirements for which they were intended for the longest possible period. It is not possible to build structures that will stand forever. They are all subject to wear and decay. The whole object is to get a material at reasonable cost, that will, when placed in position, stand the ordinary wear and tear of vehicular or other traffic, and the action of the elements as long as possible without excessive repairs.

The rapid increase in the manufacture of Portland cement and reduction in cost, has made the use of concrete available for a multitude of purposes, and to no use is it more applicable than in building such structures as bridges, abutments, culverts, retaining walls, etc. Taken in combination with steel—the steel being properly imbedded in the concrete—the two materials combine and assist each other in resisting the stresses brought upon them, each material serving the purpose for which it is best adapted.

Brick and stone were formerly used for building abutments, and in some cases, arch bridges and culverts, but only to a limited extent, on account of the difficulty of procuring the material and the cost of placing it at the site of the proposed work. On the other hand, most of the ingredients entering into the composition of reinforced concrete are to be found in every township, and in many districts, in every concession. The cement and steel have only to be hauled from the nearest railway station; and as these ingredients in the mixture are by far the least portion, it is not expensive to haul them comparatively long distances.

Plain Concrete: Plain concrete is admirably adapted to the construction of works where it is only used in compression, such as abutments for bridges. Even for that purpose the use of a comparatively small amount of steel properly imbedded in the concrete will permit of a considerable reduction in the quantity of material used, and in most cases will also show a saving in cost. At the same time it will add materially to the strength and stability of the abutment, by uniting it more firmly together and making it less susceptible to cracks from expansion and contraction.

Concrete Pipe Culverts: Small culverts up to three or four feet in diameter can economically be built with concrete pipe—preferably reinforced—but these should always be protected at the ends with concrete abutments and wing walls, to prevent the water washing out the earth under them, and permit the free entrance and exit of the water.

The pipe should be made with hub and spigot ends, and be placed close together and cemented, so that there will be no chance of water leaking through the joints and making its way under the pipe. Should this occur, there is danger of the earth being washed out below and thus cause a failure of the culvert.

Short Spans: Culverts from four feet to eighteen feet can be more economically built with flat tops, when properly reinforced, than by arch construction. The side walls should be made about one foot in thickness up to sixteen feet in height, and the footings wide enough to suit the density of the ground on which they stand.

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* Paper read before The Ontario Good Roads Association.

The wing walls should have a base of at least one-third the height and be supported by either counterforts or butresses.

Beam Bridges: For spans over eighteen feet and up to forty feet beam bridges are the cheapest and give greater water-way than arch construction.

The side walls should be made heavier than for flat top culverts in order to safely carry the increased load and beams. Wing walls should be built the same as for flat top structures.

There are cases where beam construction has been used up to seventy-five feet, but generally they are not economical for a span over forty feet.

Arch Bridges: Concrete arch bridges will compare favorably in cost with steel construction in spans of forty feet to one hundred feet, and in cases where the material for concrete is easily obtainable, this length may be considerably increased. In the construction of arch bridges a perfect foundation is absolutely essential.

In flat top and beam bridges there is no longitudinal thrust. The whole weight of the structure and load is a downward pressure. But in arch construction there is an outward thrust pressure that has to be met with an increased weight of concrete supported by a perfect foundation. Should the foundations of an arch bridge give way, the result would likely be the destruction of the bridge. In the case of a flat top or beam bridge, the settlement of a foundation might not seriously affect the structure; although in every case it is advisable to secure a perfect foundation for any kind of a structure.

Steel Superstructures: For bridges over one hundred feet span it is generally considered more economical to build them of steel on concrete foundations, and in every case they should be made strong enough to support a solid floor. It is quite true that the life of a steel bridge is not as great as that of concrete, but with proper care and attention, keeping the steel well painted, a bridge of this type should be safe for at least fifty years.

It is said that there is a cast iron bridge in France on the Seine River that was built in 1801 and is still in use.

Kind of Bridges to Build: The question of determining the kind of structure best suited to any particular crossing of a stream, can only be made after a careful examination of the site and its surroundings. No two sites are alike, and therefore a study of local conditions and requirements is necessary in every case before a recommendation can be made as to the best and most economical structure to build.

Great care should be taken to have the foundation built so that in future years there will be no danger of undermining by the scouring action of the water.

Size of Openings: Determining the length and height of openings is also an important matter. Freshets will undoubtedly be greater in future as the country becomes better drained. Ample room should, therefore, be provided for the water, for if confined in too narrow a space, scouring of the bed of the stream is sure to occur and consequently injury to the structure.

Design of Structure: In designing a structure, the first consideration should be the public safety. It is far better to provide in excess of the requirements than to have the structure too weak. Then loss of life would probably be the result. Cheapness in construction should never be considered as against the security of the traveling public.

It is an undoubted fact that a large number of the steel and iron bridges that have been erected throughout the province are now inadequate for present traffic conditions. This is not all due to imperfect design or construction. Traffic conditions twenty years ago were quite different to what they are to-day. At that time the heaviest load to provide for would probably be a threshing engine or a drove of cattle. Now the law provides that bridges shall be safe for the passage of a traction engine not exceeding in weight eight tons, and where roads are now being systematically improved, it is necessary that they be sufficiently strong to carry a fifteen ton steam roller in addition to the live load provided.

Bridge Floors: Very few of the bridges that have been erected with wooden floors are strong enough to carry a floor of concrete. In some pin connected bridges where the top chord and batter posts are strong enough, the other members can be strengthened sufficiently for this purpose, but in most cases it means the rebuilding of the superstructure.

All bridges where possible should be constructed with solid floors. Vehicular traffic on wooden floors causes a greater strain and vibration to the bridge than the same loads on a solid floor. This is caused by the irregularities of the plank when worn, and projecting knots. On a solid floor the surface is much smoother, and in consequence of it being a large slab, the stresses are distributed over a larger area.

Traction Engines: The cutting action of the lugs of traction engines is very destructive to wooden floors, particularly when they are soaked with water; and although the "Act" provides for planking to be laid under the drive wheels of the engine, this is rarely complied with.

Plans and Specifications: All plans and specifications of steel bridges should be submitted to and approved by a competent tribunal before erection. This is more necessary in the case of steel bridges than of concrete. If a reinforced concrete bridge, after the forms are removed, shows no defects, then after thirty days it is reasonable to suppose that it will stand the ordinary travel, and as its strength increases rapidly, there is little to fear for its safety. But in a steel bridge the reverse is the case. It is strongest the day it is completed, and from that day it decreases in strength.

The Legislature last session passed an Act providing that the specifications of all County Bridges should be submitted to the Provincial Engineer of Highways for approval before being built. As the majority of the bridges in the province—and in many cases those most traveled upon—are under control of the minor municipalities, this Act should apply to all bridges.

Inspection of Steel Bridges: Rigid inspection of steel bridges after erection, by a competent person, should be compulsory. The design and specifications of a bridge may be all that is desired, but if the erection is defective, then the whole intention of the design is a failure. This inspection should be made immediately after erection and before any painting is done. All rivets, particularly those in tension members, should be carefully examined and each one tested with a light hammer to see if they are loose or do not fill the holes properly. All loose or imperfect rivets should be cut out and properly replaced.

Inspection of Concrete: For concrete structures it is very important and necessary that a competent inspector should have charge of the work. He should be able to thoroughly understand the plans and specifications prepared for the work, and also have a knowledge of the different ingredients that make up the concrete, how to mix and place them in position. He should also know how the forms for holding the concrete should be made and placed, and see that they are strong enough to resist the pressure of the wet concrete. Good results can only be obtained by a thorough knowledge of materials and how to prepare and place them in position.

The Cost of Road Work and Maintenance

Method of Analysis which should be employed in Consideration of Annual Cost—The Ideal Road or Pavement Defined*

By Arthur H. Blanchard†

THE determination of the most economical and efficacious methods of construction and maintenance to be employed on roads of various classes constitutes one of the most interesting subjects which the highway engineer has to consider. The solution of the problem depends upon many variable factors, all of which must be given due consideration and the proper value attached to each. The great variety of materials and methods of construction and maintenance used, together with the absence of such essential information as traffic censuses, cost data, etc., makes it a difficult matter, sometimes, to reduce all of the different types of roads to a comparable basis for a given location. It is only within the past few years that anything has been done relative to a scientific method of taking traffic censuses on trunk highways. At this time, however, there is considerable valuable information relative to the construction and maintenance of roads to meet modern traffic conditions. Another source of confusion is the conflicting reports as to the results obtained by the use of a certain method or material. In many localities where engineers have adopted certain general methods for construction or maintenance, it may be found that such methods, although they may be successful so far as use is concerned, are not the most economical types which are equally efficacious. The cost data covering construction furnished by many highway officials unfortunately are so brief that they are practically worthless. Many times in otherwise elaborate reports a total cost per mile is the only information furnished under the heading "cost data." It is self-evident that in order to make cost data of value to the public and the engineering profession there should be given, besides a complete description of the construction, the characteristics of the materials employed and the local conditions, figures relative to rates of labor, cost of equipment and detailed data covering construction.

Professor Arthur H. Blanchard

In the case of types of roads permitting partial reconstruction every "m" years, a second annuity should be included. As an illustration of the second case will be cited the practice of Parisian engineers in the reconstruction of wood pavements. The surface of this type of pavement is maintained by the substitution of good blocks in such places as depressions, usually attributable to excessive wear of blocks of poor quality, have been formed. After a certain period the entire wood block surface is taken up, the blocks planed off and relaid. Again in the cases of many types of roads having as a characteristic a broken stone surface, a partial reconstruction of from one to two inches in depth is required every "m" years.

The other factors enumerated under annual cost need no explanation with the exception of "maintenance charge." Unfortunately in "maintenance" we have a much abused word, as the standard upon which the definition of maintenance rests varies widely throughout this country. Hence reports relative to the cost of this item as a factor of annual cost are of little value except in those cases where it is known what the highway officials mean by the statement that a road is "well maintained." The ideal maintenance, which should be striven for in every case, is a method by which the surface of the highway is kept in as good condition as when accepted on the completion of its construction. It is self-evident that it is possible to conform to this ideal only by the adoption of the principle of continuous maintenance. It is certainly deplorable that in the case of some of our public work the idea of maintenance possessed by certain lay boards will permit the surface of a macadam road to remain covered with loose broken stone, caused by disintegration due to motor car traffic, for a period of over two months. This practice, in cases where funds are available for the improvements of the conditions noted, is obviously absurd to designate as maintenance. Rather it should be characterized as criminal negligence.

Unfortunately, in many cases, first cost is the only element which is considered in the selection of the type of road, while in other cases the number of years which a pavement will last or will remain dustless is the only factor given due weight. The interest charge, maintenance required, and the annuity item seldom receive the attention deserved. Although it is self-evident that the problem cannot be solved exactly, nevertheless it is practicable to analyze the problem presented in a manner that will give as satisfactory results as are characteristic of the results obtained in many engineering problems of a similar type and thus approach within reasonable limits the ideal of economy and efficiency.

An ideal road or pavement should be durable,

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*Abstracted from paper read before the American Association for Highway Improvement.
†Professor of Highway Engineering, Columbia University.

noiseless, sanitary, efficacious for road users, easily cleaned and made dustless, should provide good foothold for horses and be non-slippery for all classes of vehicles under varying climatic conditions, yield neither dust nor mud, have a low tractive resistance, low annual cost, low first cost, low maintenance charge, and an aesthetic and impervious surface.

It should not be considered, therefore, that the idea of annual cost is paramount in every instance. For example, in Monaco, the winter home of the father of superficial tarring, Dr. Guglielminetti, ordinary macadam made absolutely dustless by ideal watering has been adopted because the primary prerequisite in that case was of an aesthetic character. In this instance it was necessary to select a dustless surface which would harmonize with the tropical gardens and palatial yellow limestone cafes, hotels, shops and villas clustered about the Casino of Monte Carlo. Again, although the annual cost is greater, many engineers favor the use of a bituminous filler for brick pavements rather than a cement grout filler, because the pavement constructed with the former is not as noisy as with the latter.

As illustrative of the method of analysis which should be employed in consideration of annual cost, a few examples will be given of cases which have come under the writer's observation.

The first illustration cited refers to a road built of water bound macadam located in an isolated and exposed district subjected to a traffic of five horse drawn vehicles and thirty motor cars per foot of width of a 14-foot roadway during the period from 8.00 a.m. to midnight in the summer season. A large percentage of the motor traffic consisted of heavy touring cars, limousines and landaulets, travelling at speeds between forty and fifty miles per hour. The kind of treatment adopted consisted of the periodic application of light oil, which, under the traffic and other local conditions, was efficacious from the standpoint of dustlessness for a period of one month.

The annual cost of a superficial treatment with a bituminous material will be investigated for comparison. The interest on first cost and the annuity will be considered the same in both cases, although it is self-evident that the road with the bituminous surface will have a much longer life. The light oil was used during the maximum period for this locality, that is, from May to November, inclusive. The cost of oiling, being one cent per square yard per treatment, was seven cents, while it was found that the cost of repairs to the macadam surface was three cents. It should be said in this connection that, although the surface was maintained dustless throughout the above period, disintegration by high speed motor car traffic took place. The total maintenance charge was ten cents per square yard per year. On the other hand if an annual superficial treatment had been employed, thus providing a bituminous surface which would have been efficacious throughout practically the entire year, the average cost of the superficial treatment would have been 5 cents per square yard, while the repair item would not have exceeded 0.5 cents, thus giving a total maintenance charge of 5.5 cents as compared with 10 cents with the light oil.

In another case coming under the writer's observation, it was decided to first construct a water bound macadam and afterwards provide a bituminous surface by superficial treatment. The annual cost of a bituminous concrete pavement, finished with a flush coat, which, under the traffic to which this road was subjected, would last five years, will be investigated for comparison. Granted that it will be necessary to reconstruct both roads by replacing the wearing surface of two inches every twenty years, the annual cost may be compared as follows: For the road given a superficial treatment annually, the first cost was 67 cents; the interest charge at 4 per cent., was 2.7 cents; the maintenance charge 7 cents; composed of a 5 cent charge for annual bituminous treatment and 2 cents for repairs, and the annuity, based upon the cost of reconstruction, was 0.9 cents. Hence, the annual cost was 10.6 cents. In the case of the bituminous pavement the first cost, under the existing local conditions, would be 90 cents; the interest charge, 3.6 cents; the maintenance, 2.5 cents, made up of a repair charge of 0.5 cents, and the cost of the flush coat, having a life of five years distributed throughout this period, of 2 cents; and the annuity, 1.7 cents. This would make the annual cost 7.8 cents, as compared with the annual cost of the superficial treatment of 10.6 cents per square yard. It will be noted that the annuity covering total reconstruction is not considered in this case. In the opinion of the writer the advantage would be with the bituminous pavement.

The lack of appreciation of the intimate relationship existing between road costs and maintenance is attributable to many causes, among which may be noted the following:

First: Political interference in the selection of the men placed in control of highway work, and with the work of design, construction and maintenance of roads and streets.

Second: The interference of controlling bodies of laymen in the legitimate work of the highway engineer.

Third: Division of responsibility in the supervision of highway work, particularly in municipalities, but also in some states, as for instance, those in which the state department supervises the design and construction, while the responsibility for maintenance is placed upon the county or town.

Fourth: The comparatively small number of well trained highway engineers who have devoted the requisite time and energy to the new problems which have arisen during the last decade.

Fifth: The comparatively infinitesimal amount of investigation which has been considered necessary as preliminary to the design of a road or street or a system of highways.

Sixth: The general meagerness of detailed knowledge of the many different materials on the market and the varied methods in connection with which they may be used.

Seventh: A confusion of ideas on the part of many as to the reasons for the success or failure of various methods, considered both from the standpoint of road preservation and dust prevention.

Eighth: Non-observance of the relationship between the adaptability of various methods and the variability in the cost of labor and materials, and the accessibility of new bituminous materials and machines.

Ninth: The search by many officials for a panacea for the treatment of all classes of roads and streets.

By an analysis of this brief outline of the relationship existing between road costs and maintenance it is apparent that the principles enunciated heretofore must have the enthusiastic support of all interested in highway improvement if economical highway construction and maintenance are to be characteristic of the future development of American highways.

Cost-Keeping and Estimating on New Work

Daily Records and Detailed Costs Essential to Success in Contracting — Their Great Value for Purposes of Comparison*

By Berton M. Laughead

THE value of cost-keeping for use in estimating on new work is not appreciated by the majority of contractors. In order to successfully make estimates that will enable a contractor to make safe bids, it is absolutely necessary that he keep daily records, in detail, of every branch of his work, so that, on completion, he will be able from such records to compile a final cost sheet that will show him the total cost and the cost per yard of his work. He should have a time book ruled as shown by the illustration. Each foreman should keep one of these time books, using a double page for each day's work, and in the remark column everything of importance should be noted at the time of occurrence, so as to have a complete record of conditions as the work progresses.

TIME PAGE MONTH DATE 191

Names.	Time, Hrs.	Rate, per Mo.-Da.	Amount $	Remarks.
John Smith, Fore.	10	3.00	3.00	Pumping out foundation caused
No. 5	2	1.50	.30	by break in dam 7 A.M.-7.30 A.M.
No. 70	10	2.00	2.00	Building forms 7.30 to 10.
No. 31	10	2.50	2.50	Concreting 10 to 4
No. 40	10	1.75	1.75	Placing Reinforcement 4 to 5.30.
No. 32	9	1.50	1.35	30 min. loss acct. rain.
No. 90	10	1.50	1.50	1 gal. cil. oil received.
No. 65	10	1.50	1.50	10 loads crushed rock received.
No. 73	10	1.50	1.50	6 loads sand received.
No. 4	5	3.00	1.50	15 barrels cement received.
No. 7	10	1.75	1.75	Placed 125½ yd. batches concrete 1-2-4.
No. 10	10	1.50	1.50	3 men digging in pit 6 hrs.,
No. 12	10	1.50	1.50	etc., etc.
No. 84	10	1.50	1.50	
No. 51	10	1.50	1.50	
No. 16	10	1.50	1.50	
No. 21	5	2.00	1.00	
No. 13	10	1.25	1.25	
No. 17	10	1.50	1.50	
No. 45	10	1.50	1.50	
Mules	20	1.00	2.00	
				Yardage for day concrete 62.5
Total			33.40	" " " exc. 12.

This time book and diary combined will show the foreman and also the contractor the progress, and the conditions under which this progress is made, also what this daily progress is costing him.

On completion of his piece of work, the foreman should turn in this daily record book to the contractor's engineer, who will use it later in making a final cost record of this particular piece of work.

Every foreman in charge of either a steam shovel, scraper, car, cart, masonry, or miscellaneous gang, should be required to carefully keep this daily record, and, as fast as the different pieces of work are completed, the book should be turned over to the contractor's engineer.

Some contractors might say that the foremen are not competent to keep such records and that it would interfere with their duties to do so. The time spent by the foreman in recording the few notes mentioned above, would be small as compared with the time he actually wastes in many other ways. The foreman who is intelligent enough to keep his personal time, write orders for supplies, etc., surely could record a few notes showing the conditions under which he is doing his work.

A first-class foreman should be glad of the chance to show the reasons of good progress, or, on the other hand, the cause of his poor showing. In the present age, men that do much travelling and are subject to such extreme change of environment, are usually more intelligent than they are given credit for, and oftentimes they would be of far greater value to the contractor if he would recognize the fact that they are his equal in many respects.

The foreman should not be treated as though he were a machine, but should be partially recognized as one of the firm, in order to hold the respect of the laborers under him.

The contractor should always remember that his success largely depends on the intelligence of his foremen and the respect they have for him.

As fast as the different pieces of work are completed, the engineer for the contractor will work up his final cost sheets, a sample of which is given herewith.

Column I, is for station number, column a-d inclusive are for classified excavation, or for various grades of concrete, as 1-2-3, 1-2-4, 1-3-6, etc., mixes, or for different kinds of stone masonry. Column e is for total unclassified excavation and the remaining columns are self-explanatory.

Several blank columns should be provided as extras, as the contractor may be called on to do work not anticipated at the beginning.

A final cost sheet should be used for each piece of work and numbered according to the station numbers, and the whole riveted together in order at left-hand margin, with paper back covering, with proper title. On the back of each sheet should be given a description of the work. If it is a masonry structure, a full description of the locality should be given, giving character of the soil, kind of foundation, description of structure, location of quarry, sand, and native timber that was used on the work.

Give distance of railroad station from the work.

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* Paper read before The American Society of Engineering-Contractors.

FINAL COST SHEET.

JOHN JONES CONSTRUCTION CO.
Contract Awarded May 1st, 1900.

CONTRACT WITH AMERICAN RAILWAYS CO.
Contract Completed January 10, 1901.

Sta.	Cu. Yds.				Total Cu. Yds.	Total No. Days Work'd.	Av. Yardage, per Day.	Total No. Cars Moved.	Av. Yardage, per Car.	Lumber M. Ft. B. M.	Const. Ties, No.	Coal, Tons.	Oil & Waste.	Explosives.	Total Labor, includ'g Supt.	Total Mules.	Water Supply.	Steel Reinf., lbs.	Lin. ft. Piles.	Cu. Yds. Exc.		Crushed Stone, Cu. Yds.	Sand, Cu. Yds.	Cement, Bbls.	Wire & Nails.	C. I. P., Tons.	Liability & Insurance.	Depreciation.	Cost Moving to Work.	Repairs During Const.	Miscel. Expenses.				Grand Total
	a	b	c	d	e															Wet.	Dry.														
Total Cost																																			
Cost Per Cu. Yd.																																			

also character of roads and cost per ton per mile for hauling. Give a full description of plant used, nationality and cost of labor, average weather conditions, and any other conditions that might be met with on similar work.

If the piece of work be a steam shovel cut, a description of the plant should be given, the nature of the soil, plan of excavation, giving method of taking out lifts, kind of dumping trestle, and method of handling dump, location of water supply for plant, cost of hauling coal per ton per mile, cost of ties and labor and nationality, etc.

The final cost sheets of the entire contract arranged in order and bound with suitable cover, will then be an invaluable guide to the contractor in bidding on a new contract. He will have the cost per yard for different classes of work and a description of the conditions under which the work was done, and can readily make a comparison to suit similar conditions, or by careful judgment and with proper adjustment, can modify his calculations to satisfy new conditions.

After going over a new piece of work and taking notes of same, the contractor with the aid of his cost records should be able to make an intelligent and safe bid on the work.

An Unusual Concrete Chimney

A reinforced concrete chimney, 144 ft. 9 in. high and having an outside diameter of 5 ft. at the base, has been built recently in London, under conditions that did not admit of using any other material in its construction, according to the engineer, Mr. Oscar Faber. In a description of the structure in "Engineering," he states that the stack was built to carry off the exhaust gases, from internal combustion engines, in a power generating station, and takes the place of four steel pipes 85 ft. high formerly used for that purpose. The choice of reinforced concrete as the material to be used was largely determined by certain clauses in the London Building Code. These required that such shafts, if built of brick, shall have a uniform batter of 2½ in. in 10 ft.; that the thickness at the top shall be at least 8½ in. and increased by one-half of a brick at 20 ft. intervals: that the width of the base of a circular shaft shall be at least one-twelfth of the height; and that any fire brick added shall be independent of and not bonded to those of the stack.

In order to properly comply with these requirements it would necessitate building a chimney with outer diameters at top and bottom of 4 ft. and 12 ft. respectively and corresponding wall thicknesses of 9 in. and 36 in. A wind pressure of 25 lb. per sq. ft. on such a chimney would cause a compression on the brickwork of 128 lb. per sq. in. and a tension of 24.1 lb. The maximum unit pressure, ignoring tensile strength, would exceed 128 lb., and the permissible value for this pressure, according to the building code, is 125 lb. This alone would require an increase in diameter and the given condition at the site would not permit of building a chimney of such a large size.

As a result the designers were left with the two alternatives of steel and reinforced concrete, the nature of flue gases prohibited the use of the former, on account of the danger of corrosion, and hence the latter was chosen. The foundation is a solid block of concrete 16 ft. 6 in. by 14 ft. and 15 ft. deep. The flue is located 55 ft. above the foundation and below that point the shaft has an inside diameter of 2 ft. 6 in. and a uniform wall thickness of 15 in. Above the flue the concrete section is 6 in. thick with a 4-in. air space between it and the 5-in. fire brick lining. Vent holes are left at the flue entrance to induce a current of air between the two shells. Experience has shown that the concrete shell is liable to crack from the heat of the flue gases, and to prevent this timber rings are imbedded at intervals in the inside face of the concrete shell. It is stated that cracking does not occur from the above cause when this form of construction is employed. This feature of the work is patented. Deformed bars were used in the reinforcement and at the points were lapped and held together with ¼-in. U bolts. The four lighting conductors were attached to four of the longitudinal reinforcing bars, and, it is stated, when the lower bars were grounded a test showed satisfactory electrical connection. This condition, it is stated, was very gratifying to the engineers as showing a continuous bond of contact between the reinforcing rods from the bottom to the top of the stack.

Wood block pavements in Wellington, New Zealand, are reported as particularly good, and those which have been in use for eight years are stated to have remained in good condition without further treatment than an occasional surfacing of tar and sand. The only renewals made have been at places where the subgrade was so soft as to allow the base to settle. The city engineer has described the construction as follows: The roadway is excavated to a depth of 11¾ in. below the finished-surface level of pavement. Six inches of concrete (composed of six parts of ballast to one part of Portland cement) are laid over the whole width of the roadway and floated to a smooth surface. Jarrah blocks, 5 in. deep, cut from planks measuring 6 x 3, 7 x 3, or 8 x 3 in., are dipped in hot tar and then laid in courses 3 in. wide across the street, the blocks in each course and the several courses being placed as close together as possible. Expansion joints 1 in. wide of well-worked clay are laid alongside each curb. The whole surface is coated with boiled tar, well brushed in, and then sprinkled with coarse sand. This tarring and sanding are repeated as found necessary. The sand used is taken from the seabeach, the particles being about the size of rice.

Repairs to a steel chimney 100 feet high and 6 feet in diameter were recently needed in seven of the courses in the middle of its height. The top five courses were in good condition and sooner than lower them to the ground and then raise them again, involving the handling of about two tons, the Chicago Bridge & Iron Works, which had the contract for the work, supported them on a scaffold while the lower sections were replaced. This scaffold had four 6 x 6-in. posts X-braced with 1 x 6-in. plank and it was in service about a fortnight.

Heavy oil for binding broken stone in resurfacing the telford macadam roads in Newark, N.J., has not proved a success, according to the 1910 annual report of Mr. Morris R. Sherrerd, chieg engineer, Department of Public Works. It is the intention now to use the old clay binder in repair work, laying the dust by a light asphalt oil after the repaired stretch of road has been under traffic for a few weeks.

Evolution of Satisfactory Specifications

The Comparative Method and its Advantages — Collection and Classification of Material — Points to Embody in a Satisfactory Document.*

By H. B. Breitenbach†

THE preparation of specifications and contracts forms the subject of several comparatively recent books, written particularly for the use of engineers. But satisfactory and complete as some of these are in other respects, not one gives adequate attention to a most important phase of the problem confronting the engineer who has such documents to write.

For in studying the subject of preparing specifications and contracts, three points of view emerge. The first is the legal one, that of the lawyer, who views the situation as subject to and controlled by certain laws and statutes, which in turn are interpreted according to various judicial decisions. According to this viewpoint, he who draws up the document, be he a lawyer or engineer, must frame it so equitably to all concerned as to prevent the need of litigation, so far as possible; or, if litigation does ensue, to ensure the rights of all parties concerned.

The second point of view to be distinguished is the technical one, that of the engineer, whose primary duty as such is to see that the specifications embody the best practice recognized in his profession, so as to secure safety, efficiency, and economy.

The third point of view may be called the rhetorical one; it is that of the writer who, while keeping in mind the legal and the technical requirements, strives to express his meaning so clearly in the document that not only is no misunderstanding likely to arise therefrom, but even that no misrepresentation is fairly possible. This last requirement in the preparation of specifications and contracts has been almost wholly neglected by authorities on the subject.

Among practising engineers themselves current opinion varies widely with regard to the best method for preparing specifications. Many have only a confused idea as to the possibilities of the situation. For instance, some assume that a single ideal set of specifications can be prepared which will deal adequately with any case, at least in its general phases. Others maintain that as every piece of work is unique, it requires an altogether unique set of specifications. Actual methods of preparing the docements vary accordingly. Cases have come to light where large portions of specifications have been blindly opened and incorporated in another document dealing with a different set of circumstances. Some engineers have a set of general clauses which they use for nearly every case. Others write, or attempt to write an entirely new set for each situation. No doubt many engineers have not formulated any particular ideal nor any particular method, but work in a somewhat haphazard manner.

Comparative Method of Preparing Specifications

The Comparative Method of preparing specifications recognizes and is based upon the evolutionary process through which in large measure the present-day standard of efficiency in specifications has been attained. Its aim is to forward the evolutionary process by making it both more rapid and more economical. For, on the whole, the process has been both wasteful and slow. Improvement in a clause of a specification has come about when that clause permitted unsatisfactory work, caused a monetary loss, or led to a lawsuit. In this way, engineers have profited by their mistakes; but the cost has been great. And only very slowly have engineers profited by the mistakes of others. Thus the situation may be summed up in a phrase by saying that progress has come about as a result of failures.

The Comparative Method, which endeavors to hasten the process of improvement without the necessity of such losses and failures, is not applicable in all cases, but only where a sufficient body of data can be secured to afford an opportunity for comparison. In the other cases a different method must be employed which cannot be discussed here.

The Comparative Method itself requires the formulation of the ideals toward which the evolutionary process appears to be tending; and then in accordance with these ideals three progressive steps are taken. The first is the collection and classification of the available data. The second is the comparison and organization of this material. The third is its reconstruction and improvement. The meaning of each of these will be set forth later in full detail.

The ideals toward which the evolution of specifications appears to be tending, may be studied from any of the three points of view that were distinguished at the outset. Thus, in the legal aspect, they have tended toward greater fairness to all parties concerned. Technically considered, specifications have, of course, developed toward the ideals of efficiency and economy in their engineering results.

From the rhetorical standpoint, the one which alone concerns us, the main ideals may be named logicalness, completeness and accuracy. Logicalness refers to the inter-relations of the details. The tendency here noted is to arrange and organize the material in the way that will best convey the meaning desired. Completeness refers to the need that the specifications include everything necessary, without, of course, retaining anything superfluous. By accuracy is meant definiteness and directness in details; the tendency is toward the specific as opposed to the general, to the exact as opposed to the vague.

Collection and Classification of Material

These ideals having been formulated, the Comparative Method requires as a basis for their application, the collection and classification of as much material as possible. That is to say, as many specifications as may be had dealing with the desired subject are first obtained. Sources of such material and methods of obtaining it are suggested below.

To illustrate the method, let us suppose that an engineer wishes to prepare a specification. According to the textbooks, he would go about his task in one of two ways. He might take as model some set of specifications already used and imitate that as closely as circumstances permitted. Or he might prepare a wholly original set of specifications, formulating and expressing his requirements as well as he could. But the Comparative Method would require a somewhat different procedure, one which retains the good features of both the other methods, while seeming to advance beyond them in effectiveness.

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As a preliminary, our engineer would, as mentioned above, collect all the examples possible of specifications bearing upon the given subject of his work. His first task now is to prepare a logical and consistent plan on which to base his own specification. This may be accomplished inductively, by a study of the plan of similar specifications in his collection. But especially for the engineer of limited experience, comparison had better be deferred, and the deductive method employed first. In following this method, he will first set down the main division on his subject, afterward arranging them as seems best. For example, in planning the general clauses of his specification, he may adopt such familiar headings as Scope of Work, Duration of Work, etc. These main headings are to be similarly subdivided; for example, Duration of Work will include Time of Beginning and Concluding, Progress, and the like. The engineer will receive considerable assistance in this portion of his work from the standard textbooks, especially Tuckers, which, as already mentioned, gives various synopses of specifications. Further information on methods of outlining may be derived from a textbook on rhetoric; for this particular purpose Earle's Theory and Practice of Technical Writing is probably best adapted. If, however, the engineer makes use of such an analysis as that in Tucker's book, he will derive considerable advantage from putting it in outline form throughout. For example, the topic "Laborers" as analyzed on page 260, might better be outlined as follows:

(1) Preference as to residence and nationality.

(2) Hours.

(3) Board:

  a. No farming out of commissary.

  b. Choice of places to be left to men.

Also similar topics should be brought together. So the heading "Workmen," referring to their competency and to their liability to discharge by the engineer, should be brought into evident relation to the topic headed "Laborers."

Completeness, and Its Interpretation

The second essential of a good specification, completeness, may be studied in very close connection with logicalness, and by similar methods. The requirement of completeness needs to be interpreted relatively, not absolutely. Unwarranted inclusion or elaboration of details will divert attention from matters of greater importance. In short, conciseness of expression should be sought for, but never at the expense of the other qualities mentioned, which are more fundamental.

Accuracy

Our engineer's final task is to secure accuracy and definiteness in writing the clauses of his specifications. As a basis for this he will compare the individual clauses of similar import in his collection of documents, with the idea of selecting the one that is expressed the best and of improving upon it if possible. Take for example so simple a detail as indicating the time for beginning work. This, it would seem, would admit of little difference either in method of specifying or manner of expression. But consider the five following clauses all taken from recent specifications:

> The Board reserves the right to determine the time for commencing work.
>
> The contractor shall begin work immediately after the execution of the contract.
>
> The contractor will be required to commence work under the contract within 30 days after the date of notification of approval of the contract by the Chief Engineer.
>
> The contractor agrees to commence the work herein required to be done within 10 days after the signing of this contract, unless the Board of Trustees shall authorize a further delay.
>
> The contractor shall begin work within 30 days after the contract has been awarded.

Of these clauses, the first does not define the time for commencing work at all; the second limits it by the indefinite "immediately;" the third makes it depend upon a notification the time of which cannot be forecast; the fourth begins well enough, but all definiteness is removed by the qualifying clause beginning "unless." The fifth is the most specific in meaning, and therefore, other things being equal, its form of expression is to be preferred. For the sake of illustration, it is assumed that nothing in the nature of the engineering situation makes an indefinite statement necessary or desirable.

The question, then, is not whether a sufficient interval of time has been afforded the contractor in which to prepare to begin work; the question is, from which method of statement can he learn most definitely exactly how much time he is allowed.

Having, as in this case, selected the clause that seems most accurate and specific, our engineer may then proceed to improve upon it if he can, and adapt it to his particular purpose. Of course, the opposite procedure might be used; that is, one might first write his own clause as well as he could, and then compare it with others to see if it could be improved.

It need scarcely be said, it would seem, that except for some special reason all the ideas in a specification should be expressed in complete sentences, and that these, according to the first requirement, should be logically related. Yet the following quotation from a recent specification indicates that the caution is not unnecessary.

> All exterior walls of brick equal to best home product and faced on two sides and return quoins with gray mottled Roman brick, the west and north and east sides faced with selected home brick as per sample.
>
> Dampproofing at the ground level, also all brick walls rendered with good coat of coal tar, applied hot, before plastering.
>
> Finished cement floors, entire cellar.
>
> Cellar ceiling and 2-in. partitions; one coat of plaster, neat, smooth finish.

Here, to be sure, we have no real specification at all, but only rough, disjointed notes from which the specification ought to have been built up. But while this is perhaps an extreme case, many current specifications because of their exactness in details afford ample opportunity for disagreement, sometimes leading to litigation. James W. Rollins in a paper read before the Boston Society of Civil Engineers, quoted several such clauses, of which the following is an example: "A pile shall be at least six inches at tip and not less than 30 ft. long." "Does this mean," Mr. Rollins asks, "that the minimum of 6 ins. for tip and 30 ft. for length shall be allowed to be used, and as much larger tips or longer length as the engineer may require, or does it mean that no pile can be required driven with a larger tip than 6 ins. and a longer length than 30 ft.?" Another example, brought to the author's personal attention for his judicial interpretation, reads: "Imbed six 1-in. cup bars also the ⅝-in. bars in concrete shell encasing all steel columns, as shown on detail sheet No. 4." The question that arose was thus expressed: "According to the above paragraph of the specifications would you understand that steel bars are to be furnished for all steel columns or only the particular columns shown on detail sheet No. 4?"

Another example is where an engineer first wrote his specifications calling for different prices for excavation at different depths, clearly expressed as so much for "less than 6 ft.," so much "between 6 ft. and 10 ft.," and so on. He revised the specifications to read so much for "excavation less than 6 ft." and so much for "excavation less than 10 ft." and so much for "less than 14 ft.," leaving it doubtful whether or not separate prices were to be paid for different depths at the same place in a deep trench. That engineer's client, a municipality, lost at least $180,000 on that contract, largely made possible by that change from clearness to vagueness.

In the last case, it will be apparent, if the engineer had taken the trouble to compare even his own versions of the same clause, he must have seen that the first one was the more accurate and definite, and hence to be preferred.

Pros and Cons of the Method

The advantages of the Comparative Method, as thus illustrated, are that it permits the engineer to avail himself of the results obtained by others and also of those afforded by his own efforts. Furthermore, it enables him to attack the problem of writing a specification in separate phases, instead of as a whole merely. So by concentrating his attention on one phase at a time, he can deal with each more effectively.

Two practical difficulties, however, seem to stand in the way of the general adoption of the plan. One is that it seems to require more time than the ordinary methods. This, however, is not the case in the long run. It would, of course, take more time for the first specification prepared in any class, but subsequent documents in the class could be prepared in much less time than formerly.

The other and more important difficulty is that of securing copies of specifications for purposes of comparison. Engineers no doubt are sometimes jealous of their personal rights in specifications and are unwilling that these should have any greater publicity than is necessary; sometimes, too, they are overmodest in regard to the value of their own documents, and hence unwilling to exhibit them. But such cases are rather the exception; at any rate, most engineers, if aware that their specifications would be of any professional value to their brother engineers, would doubtless be glad to advance the interests of the profession.

Something more than individual action seems called for, however, if the interest of any large number of engineers is to be enlisted. Collections of specifications ought to be made and located where they may be of general service. Such work may well be undertaken by at least two existing agencies. One is the technical schools; by appealing to their graduates they could doubtless secure most useful collections of material. The second is the great engineering societies. If they secured from all their members copies of their best specifications, perhaps with annotations indicating their success, what a fund of valuable knowledge would be made available.

Pending such a consummation, the individual engineer may make some progress in forming a personal collection. Copies of government and municipal specifications are generally easy to obtain. Probably too, copies of other specifications may be secured from fellow-engineers, either by exchange or simply on the ground of professional courtesy.

As already noted, the Comparative Method is not readily applicable in some cases because of the lack of data for comparison. In other cases, the work of securing a standard set of specifications has been pretty effectually accomplished. But these represent the two extremes; between them lies a vast field where the method will be found applicable and useful.

In conclusion, the inter-relation of the three standpoints distinguished at the outset may be further indicated. The lawyer's function in the preparation of contracts and specifications is now generally recognized. It is pretty well understood that someone who fully comprehends legal principles in their bearing upon engineering must be consulted when the documents for an engineering project of any magnitude are prepared. Such a person usually draws up the contract proper, or "covenants," and looks over the specifications, etc. in a general way. This person may be a lawyer who has devoted especial attention to the legal aspect of engineering, or he may be the engineer himself who has studied law for this purpose.

But there is a third standpoint also, whose importance has not been so fully appreciated. As documents for the expression of thought, both contract and specification are subject to the principles of rhetoric, and so fall within the province of the writer as such. Now by the nature of his training the lawyer is more or less prepared to assume the rhetorical viewpoint; for throughout its course the law never parts company from language. The engineer, however, for obvious reasons is not so well prepared in this respect. Consequently, if he is to assume the third standpoint as well as his own, he must do so with more of a conscious effort. The principles of rhetoric come to his assistance in two ways: first, in suggesting economical and efficient methods of composition; and second, in encouraging on his part a critical attitude toward his own productions. In both composition and criticism the Comparative Method, as outlined above, will, it is believed, prove of service to the engineer.

Trestle stringers and caps, protected from dampness and fire by galvanized-iron covering, are found to have an increased length of life of more than 100 per cent. on the Nashville, Chattanooga & St. Louis Railway, according to Mr. A. F. Ganier. Stringers are covered with No. 22 galvanized iron sheets 34 in. wide, made continuous by crimping the joints. Tie dowels in the stringers are forced upward through this sheet, raising a rim of metal around each, which tends to keep out water. Caps are covered with the same material in 18-in. sheets made fast by straps riveted to the cover sheets. The galvanized-iron sheets forming the cap covers are turned up at the stringers and the ends are run under the stringer covers, thus producing a continuous protection against water at these points.

A New Winnipeg Building

The Union Trust Company's building at Winnipeg, which is now being constructed by the Geo. A. Fuller Company, according to plans prepared by Mr. J. D. Atchison, will be 160 feet—or twelve storeys—high. The building is shaped somewhat like a wedge, the dimensions being 29 feet on the smallest end, 69 feet on the widest and 100 feet on the shortest side. Operations were started early in the present winter. The foundations are now completed and the cantilever girders are being installed. The foundations are built on concrete piers sunk to a depth of 65 feet to the rock. The construction is of steel and terra cotta. The floors are built on the arch tile system. The first two storeys are faced with marble and the material used in the remainder of the facings is mat-glazed terra cotta. The floors and the wainscoting in the corridors are of marble, while the offices on the main floor, which will be occupied by the Union Trust Company, will be finished throughout in marble. The elevator enclosure metal work in the stairways, as well as all outside metal work, will be of statuary bronze. The building will be lighted by electricity and will be heated by low pressure steam plant. The contract for the steel work was awarded to the Minneapolis Steel and Machinery Company.

Union Trust Building, Winnipeg
Architect : Mr. J. A. Atchison, Winnipeg

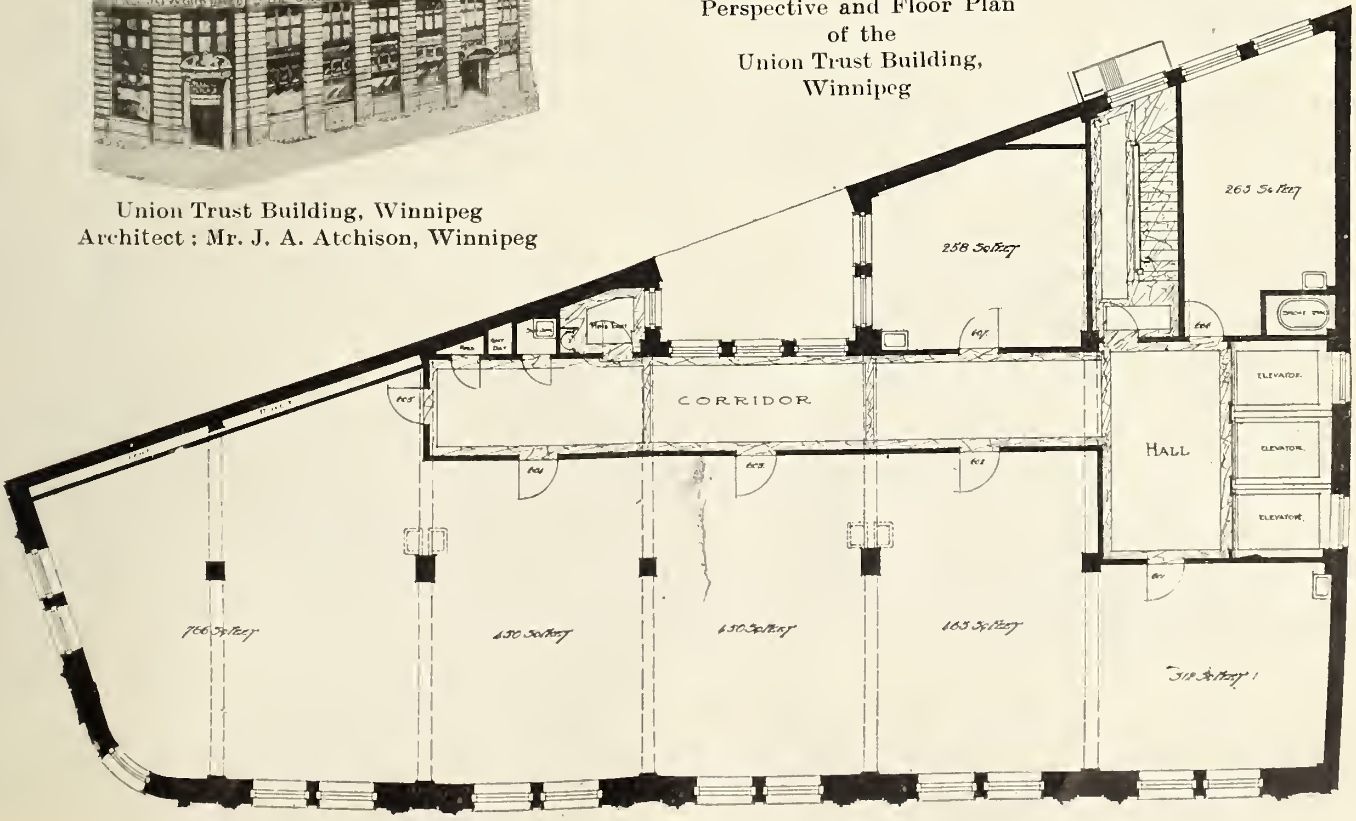
Demolishing Reinforced Concrete Structures

The recent demolition of a notable structure in Cincinnati, erected only ten years ago, is possessed of points of interest, not only as illustrating the growing tendency to demolish the old and construct the new, but because it was of reinforced concrete and not only presented difficulties but was one of the first concrete structures of size and importance to be razed in this country, says the American Contractor. Its demolition showed the great strength of concrete construction and likewise suggested improvements that have been made within the passing of a single decade.

The structure referred to was the reinforced concrete grandstand of the Cincinnati Baseball Club. Though erected so recently as the spring of 1901, it was the first notable structure of that class to be constructed in Cincinnati and the first to yield to the demand for something greater. It was erected by the Ransome Concrete Company and in accordance with the Ransome system.

Baseball has kept pace with the general forward movement of the times and a grandstand that was seldom filled to its capacity ten years ago had proven inadequate to present demands. To obtain great seating capacity and likewise secure a larger field, the old structure was doomed and orders for a new

Perspective and Floor Plan
of the
Union Trust Building,
Winnipeg



one, a little distance removed from the old one, placed. The structure was literally battered into fragments, a pile-driving hammer weighing 3000 pounds being employed. This was operated from a derrick with a 50-ft. boom. The derrick was erected on the roof of the grandstand and was moved along as the work of destruction progressed. Falling a distance of 50 ft., this immense hammer struck tremendous blows, which even reinforced concrete could not resist. The roof destroyed, work was begun upon the floor. The columns were pulled down with a traction engine. This was readily enough accomplished after the vertical column bars had been cut by an oxygen-acetylene torch. With but trifling exceptions the structural material was found to be well preserved.

The work of razing attracted the attention of architects, engineers and concrete builders, all anxious to study and gain information. In some respects the building demolished was found to conform with the practice in vogue at the present time. This was particularly true of the concrete mix, the cold-twisted steel reinforcement and the tensile and compression stresses. Engineers decided, however, that the subject of shear was not so well understood ten years ago as at present. The beams were narrow as compared with their height and bent tension rods and web reinforcement were lacking. When the hammer broke but did not crush a beam, the failure was always in the web by diagonal tension or horizontal shear. The decision of experts was that reinforced concrete construction has been considerably improved during the past ten years, since the structure wrecked was built after the best methods known at the time.

Two different concretes were employed in the construction work, each a 1:2:4 mixture, and their condition after being broken up proved of considerable interest. One of these, in which the aggregates were crushed limestone, broke into quite small fragments, producing considerable dust. The other, formed of washed river pebbles, were broken into larger fragments with very little dust.

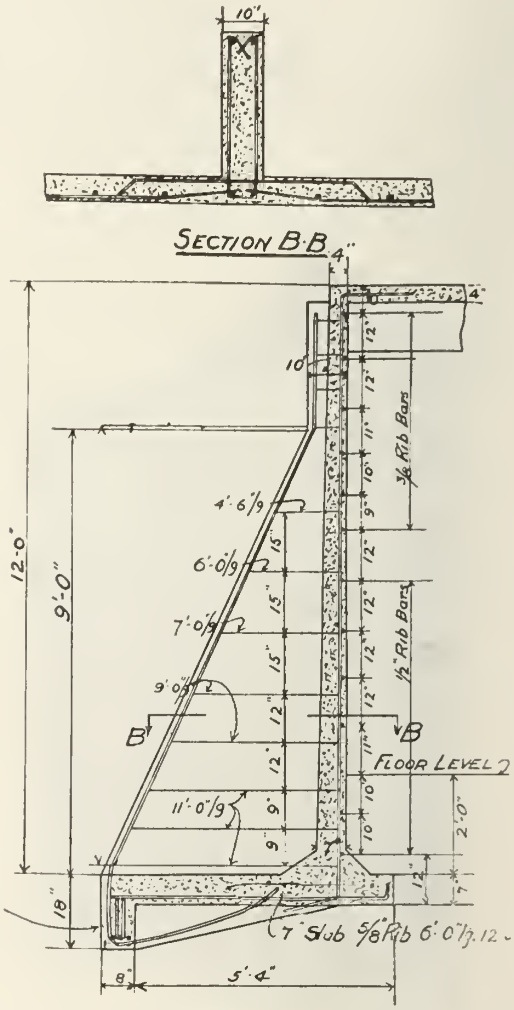
Concrete slab spans are used for all ordinary bridges up to 20 ft. on the Nashville, Chattanooga & St. Louis Railway, according to Mr. A. F. Ganier, and a standard type and method of design have been adopted to simplify office and erection work in this connection. The floor is a simple flat slab with shoulders to retain the ballast, which is built at one side of the final location and skidded into position on plain concrete abutments. The principal reinforcement is old rails, mostly of 40 or 52-lb. section, 12 to 15 being used, according to the span. Provision for web stresses is made with expanded metal instead of stirrups or bent rods. A 3 x 8-in. mesh weighing 0.6 lb. per square foot is used, passing under the rails and bent upward to the top of the beam in each of the spaces between pairs of rails, so as to form a continuous series of ridges or nearly vertical planes of mesh reinforcement. A second sheet of this metal is laid across the bottom of the beam to bind it together horizontally. Design curves are prepared for these slabs so that the depth of beam may be readily found for any span.

Montreal now has another brick manufacturing concern, the Canadian Brick Co., Ltd., having secured incorporation with a capital of one million dollars. The incorporators include Messrs. O. B. McCallum, B. F. Bowler and T. B. Longmire.

Retaining Wall at Bridlington, England

Ernest R. Matthews, Assoc. M. Inst. C.E., F.G.S., Borough Engineer, of Bridlington, England, has designed, and has now under construction the retaining wall shown in the accompanying sketch. Following are some notes on the work by Mr. Matthews:

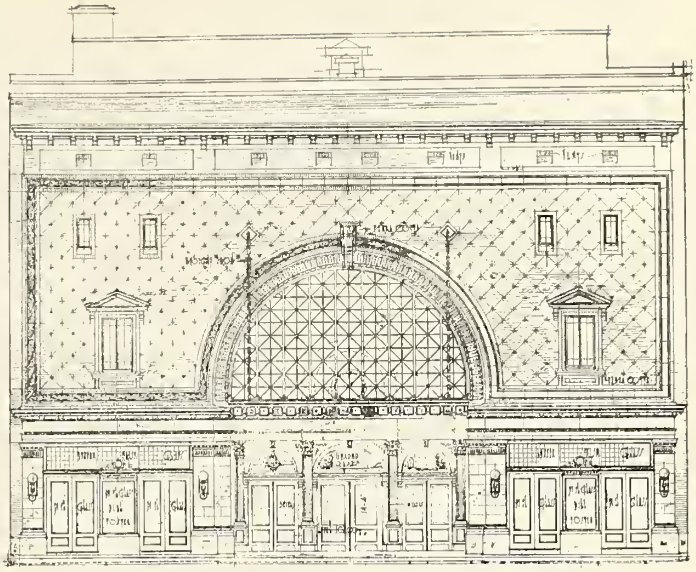
"The reinforcement is on the Kahn system; the wall is 7 in. in thickness at base, and 4 in. at top, with 10 in. buttresses at 10-ft. centres. The concrete which is being used is in the proportion of 1:2:4. The wall is 12 ft. in height, 100 ft. in length, and by using reinforced concrete I estimate a saving of 25 to 30 per cent."



Section of Retaining Wall at Bridlington.

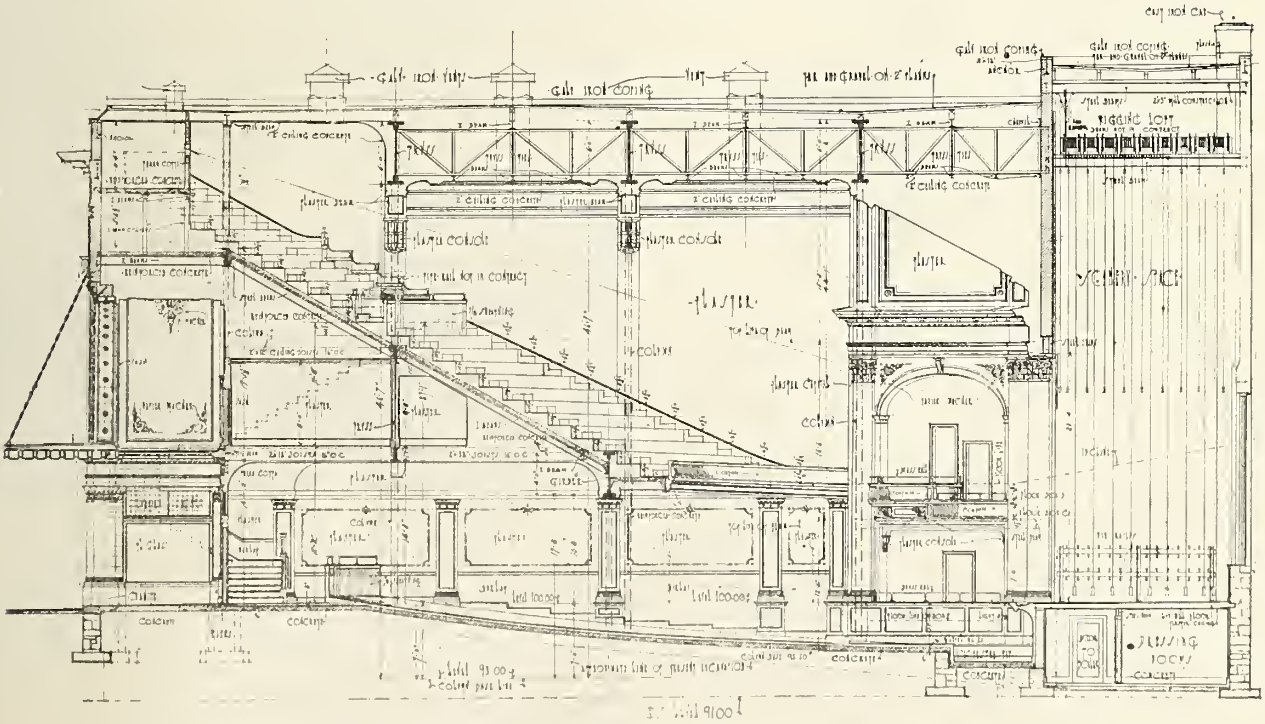
A sand-clay road at Mullinville, Kan., was built by the Office of Public Roads during the last fiscal year and the following cost records of it are given in the last annual report of Director Logan Waller Page: The adjacent land is hilly and the soil sandy. There were 3635 cu. yd. of excavation with a maximum cut of 6½ ft. and an average haul of 223 ft. The maximum grade was reduced from 11 to 6 per cent., and a total length of 4460 ft. was graded. This excavation cost 11.2 cents per cubic yard. The road was graded 24 ft. wide. It was prepared for a distance of 3640 ft. for surfacing 14 ft. wide, and on this were placed 1758 cu. yd. of clay hauled from a pit an average distance of 2340 ft. The cost of hauling this clay was 31.4 cents per cubic yard, and the cost of spreading it 1.6 cents per cubic yard. The clay was placed on the roadbed 12 in. deep at the center and 10 in. at the sides, and was thoroughly mixed and compacted by traffic to a depth of 10 in. at the center and 8 in. at the sides, with a crown of ½ in. to the foot. The roadway was given 5-ft. shoulders, making a total finished width of 24 ft. Other items of expense on this road were: Shaping the subgrade, $23.20, and stripping the clay pits, $41.70. The total cost of the road to the community was $1,045, which is at the rate of 18.4 cents per square yard for the finished surface, or $1,425.75 per mile.

Duchess Theatre, Montreal


Duchess Theatre, Montreal.—Front Elevation

The Duchess Theatre, Notre Dame street west, Montreal, designed by Messrs. Dufort & Decary, architects, will cover an area of 66.8 ft. by 110 feet, the plans providing for a ground floor and balcony, which will afford accommodation for 1400 people. The foundations will be of masonry, with the structure of brick. As will be seen from the cut, the exterior will be of an ornamental character—terra cotta up to the first cornice and the remainder in plastic brick worked out in pattern in different shades of brick, with terra cotta trimmings. The main entrance will have glass doors, with a leaded glass elliptical panel above; part of the design consists of fluted plasters and ornamental capitals. The marquise is to be of wrought iron and glass, supported by heavy iron chains and hooks imbedded in the terra cotta panels. On either side of the main entrance are exits, the doors being of bevelled plate glass and luxfer prism glass.

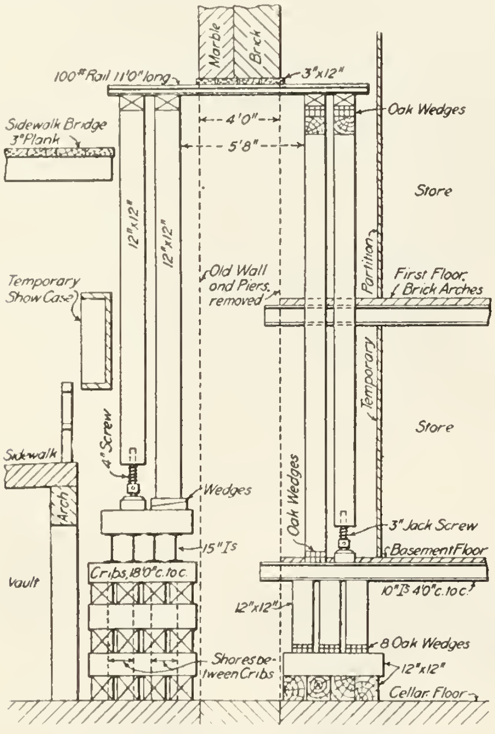
The lobby floor will be in terrazo and the interior is to be finished in hardwood. The concrete flooring with mushroom reinforcement will rest on concrete piers. The ceiling beams will be in plaster, moulded with plastic consoles at the end. A room for the cinematograph operator is to be provided in the balcony. A feature is the absence of columns, the balcony being supported by heavy trusses and girders running from wall to wall. This gives a very fine sight line. Paper mache and plastic decorations enter into the treatment of the front of the auditorium. The building is to be made fireproof. Gas and electric lighting will be installed.


Duchess Theatre, Montreal. Longitudinal Section

The conditions have been drawn up for the competition for plans for the new Technical Institute at Toronto. The competition will be restricted to Canadian architects and the first prize will be the appointment as architect and superintendent of the building. The successful architect will receive a commission of something like $37,500, the estimated total cost of the structure being upwards of $800,000. The authors of the second and third designs will receive $800 and $500 respectively. The building is not to exceed five storeys in height. It will contain an Assembly Hall with a seating capacity of 1,500, a lecture theatre to seat 200, thirty class rooms, twelve laboratories, work shops, gymnasium, etc. There will be 20 shops devoted to the various building trades. The designs are to be submitted by June 15.

Shoring and Remodelling the Front of a Large Building

THE six-storey building at the intersection of Sixth avenue, Broadway and Thirty-second street, New York, which formerly housed the Union Dime Savings Bank, and is now occupied by stores in the lower part, had twelve granite columns, two and four storeys high, in the street facades which, together with entrance stairs and other projections, it was necessary to move in conformity with the municipal ordinance which prohibits projections beyond the building line. As these alterations involved considerable structural change, it was decided to remodel the lower part of the front, and to replace the massive masonry piers and walls there by steel columns and girders, thus accomplishing an important economy of interior space. The method of supporting the old superstructure without injury during the removal of the substructure, the erection of the steel work and the execution of the heavy and delicate operations while business is maintained in the store and heavy traffic is uninterrupted in the street and on the sidewalk is here described.



Section of Wall and Shoring

The basement, with a floor about 4½ feet below the sidewalk level, and the first storey are both occupied by clothing stores. The cellar, from 5 to 8 ft. high, is used for boilers, machinery, pipes, storage, etc. The walls to be removed extended around three sides of the building inside the vault walls, with concrete footings on the earth below the cellar bottom which were considered adequate for the foundation of the new steel columns. The walls are 3 feet 8 in. and 4 feet in thickness up to the second floor, and consist of a marble front about 10 inches thick backed up with solid brickwork, all of which is to be removed up to the second floor.

In order to disturb the stores as little as possible the work was divided into two nearly equal portions, successively executed so that in one-half of the stores no operations were begun until the other half had been completed and additional space provided. The work was started on about 60 lineal feet of the wall on the Broadway face and one-half of the Thirty-second street front, and the remainder of the Thirty-second street front and the Sixth avenue front will be done in the same manner.

It was at first proposed to cut large holes through the masonry and insert in them long and deep I-beam needles, which would be difficult to handle under the existing conditions and would occupy a large amount of interior space besides involving so much cutting that a considerable portion of the valuable exterior cut-stone work would be destroyed. This plan was avoided and the wall was supported on very shallow needles which were compactly arranged and occupied a space of less than 5 feet beyond the interior face of the wall.

A continuous grillage 4 feet wide, of solid timbers laid parallel and close to the outer wall was placed on the cellar floor and two and three-post bents of vertical shores were set on it and wedged up against the bottom flanges of the basement floorbeams, 4 ft. apart. Partitions of matched boards, covered on the outside with tar paper, were built parallel to the outer wall and 5 feet within it, to provide working galleries for the installation and operation of the needle-beams, show-cases were set on them, the counters were arranged to correspond, and the space between the partitions and walls was vacated for the shorers.

A strip of the basement floor was removed to expose the upper flanges of the floorbeams just above the cellar shores, and on them were laid two longitudinal lines of stringers receiving two-post bents of vertical shores, some of which supported the bottom flanges of the first floor beams and others adjacent to them passed through the first floor and supported caps parallel to the walls which received the needles just below the second floor level. The second floor and the floors above it having wall bearings did not require independent shoring.

Timber cribs about 12 feet long and 4 feet wide and from 6 to 8 feet apart in the clear were built close to the face of the wall in the open areaway between the front of the building and the sidewalk vault, and on them just below sidewalk level were carried four lines of I-beams with vertical shores seated on them opposite the wall piers.

A deck about 12 feet wide, of 3-in. planks, supported on the usual transverse bents was built just below the second floor level to protect the sidewalk, to serve as a working platform and for the storage of materials. From it and from the inside scaffold, holes were cut through the wall and through the 6 x 4-ft. and 4 x 3-ft. 8-in. piers between the 4-ft. windows, and in each hole a set of 100-lb. steel rails 11 feet long, with a clear span of 5 ft. 8 in. was supported on the shores. The rails were arranged in double tiers with alternate rails reversed so as to pack closely together, thus occupying spaces only about 6 in. high and from 16 to 24 in. wide.

Cushions of 3 x 12 in. planks were wedged tightly between the upper surfaces of the rails and the masonry, and special care was taken to support the marble face stones so that they should not be displaced or their bond broken. The heaviest pier, with an estimated load of 275 tons was carried on ten rails which deflected less than ¾ in. One of the shores under each end of each group of rails was provided with a 3-in. steel jack screw and the other was set on several oak wedges. The jack screws were simultaneously operated to raise the wall about 1/16 in. as regularly and accurately as possible, and as soon as this demonstrated that the full load was positively transferred to the needles the wedges were adjusted under the other shore to follow up the other jack and provide positive bearing independent of the jack.

All of the masonry between the needle-beams and the old footings was removed by the shoring contractor who loaded the debris into one-yard steel buckets in the areaway and hoisted them by a stiff-leg derrick through a trap in the sidewalk bridge and stored them on the latter until it was convenient to deliver them to trucks in the street. After the removal of the old masonry a set of temporary show-cases was installed in front of the building adjacent to the sidewalk so that the store's display could be maintained while the new front was being built. The first section of wall was shored and the new steel work erected without any settlement or injury to the building or without serious interruptions to business.

G. T. R. Construction at Ottawa

The Grand Trunk Railway System have just completed the erection of steelwork for their train shed at Ottawa, in connection with their new station and hotel. The shed, when finished, will be 530 feet long, and will cover seven tracks. It extends over an area of about two acres. Six tracks are stub tracks and one a through track. They are laid out in pairs of 13 ft. 0 in. centres, with 18 ft. 0 in. platforms. The design of the shed is what is known as the "Bush Type," or a low roof train shed. The roof is supported by cast iron columns, 27 ft. apart, down the centre of each platform. The columns are 42 ft. 9 in. apart transversely with the tracks. The columns are connected by transverse arched girders extending over two tracks, and by longitudinal girders over the centre of platforms. The sides of train shed will be composed of concrete walls with windows for the purpose of ventilation and light. The roof will be composed of a concrete slab, waterproofed by a tar and gravel roof, and drained by down pipes inside every other column. For the purpose of lighting the shed, about 30 per cent. of the roof will be composed of skylights.

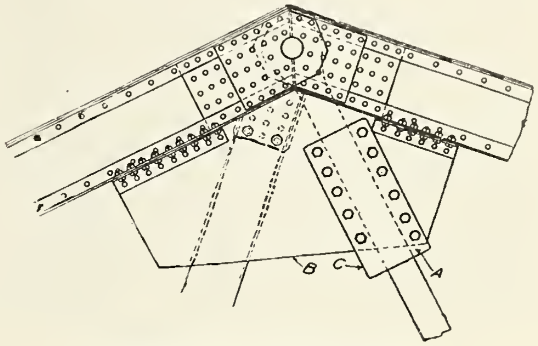
Over the centre of every track for the total length of the shed, there will be an opening in the roof with two side concrete walls, extending to the smoke stack of the engine. This is for the purpose of sending smoke from the engines directly out of the train shed, thus keeping the shed clear of smoke. The weight of steelwork and cast iron columns totals 1000 tons.

Steel Work for New G. T. R. Train Shed at Ottawa

The following are the contractors for the various parts of the work: Steelwork, fabrication and erection, The Structural Steel Company, Limited, Montreal; concrete foundations for columns, sidewalks and roof slab, The John S. Metcalf Company, Montreal; supplying and erecting skylights, MacFarlane Douglas Company, Ottawa; waterproof roofing, Messrs. Campbell & Gilday, Montreal.

Replacing Pins in a Bridge in Service

An unusual repair job was recently performed on one of the Chicago bridges of the Chicago, Milwaukee & St. Paul Railway. The bridge crosses the north branch of the Chicago River between Division street and North Avenue and was built in 1902. It is a through truss swing structure 230 feet in length, with unequal arms, the long arm extending across the river and being counterbalanced for overhang. The pins and bearings became so worn that it was deemed advisable to replace them. Previous to this, all such jobs had been performed by erecting falsework and removing the members to the shop, where they were re-bored. Even under the most favorable circumstances, this hindered navigation for several days, and on account of river traffic some trouble was experienced in receiving government permission to shut off navigation. It was finally decided in this case to try a new scheme of boring out the holes and replacing the worn pins with larger ones, without removing any of the members.



Connections at Rebored Joint

Preparatory to removing each pin, it was necessary to securely clamp the members at the joint. Steel plates, A, four in number, were used to hold the eye-bars. These were placed on each side of the eye-bars with a block of wood, C, fitting tightly between the inner two while the outer two reinforced the plates B, which were directly in contact with the eye-bars. The whole was bolted together by 1-in. bolts, thus developing enough friction between the plates to take care of the dead-load stress in the eye-bars. The two plates B, one on each side, were fastened to the lower flange of the top chord and to each end post by angles and bolts, and supported the hanger by bolts as shown.

Upon removing the pins they were found to be considerably worn and their bearings somewhat enlarged. The holes were rebored from the original 5-in. diameter to 5¼-in. diameter by using a portable boring bar made by Joseph T. Reynolds & Son, of Chicago, and although it was designed primarily for boring locomotive cylinders in the shop, nevertheless it gave perfect satisfaction even under these adverse circumstances. The power plant consisted of a section car, containing a gasoline engine and air compressor. The boring bar was directly driven by a small air drill which operated the shaft and furnished the required power. Work on this job was started at 6.00 a.m. on the morning of November 6 and by 8.15 p.m. of the same day the four pins had been removed, holes rebored, new pins inserted and traffic was passing over the bridge.

Explosives for Use in Quarrying

THE United States Bureau of Mines, charged with investigations looking toward a reduction in the number of deaths in the mines, has just issued a bulletin on the subject of explosives. The investigations were conducted by Clarence Hall, W. O. Snelling and S. P. Howell, and the purpose was to determine which explosives are the most suitable for use in mines and the precise conditions under which they may be used with the greatest safety.

The general introduction to the bulletin, written by Charles E. Munroe, consulting engineer of the bureau, states: "The United States government does not compel nor prevent the use of any explosive or prescribe the conditions of use. It only advises the public as to the character of explosives and as to the manner in which they should be used. It is, therefore, gratifying to state that the manufacturers of explosives in this country co-operated so promptly and so cordially in the endeavor to protect the lives and persons of those engaged in mining coal that by January 1, 1910, there had been received at the Pittsburg testing station of the bureau fifty-one applications for the testing of 134 explosives. During that year sixty-four of the explosives submitted were tested and thirty-six of these passed the tests required to place them on the list of permissible explosives."

The bulletin describes the method used in testing explosives and defines what a permissible explosive is. On this subject, W. O. Snelling says: "In explosives for use in the open air, such as, for example, quarrying or railroad excavation, strength and efficiency in removing rock are the qualities that are most important, and usually are the only ones that need consideration in the selection of a suitable explosive. Explosives that are to be used in tunneling must not only possess strength and efficiency but also of such composition that upon exploding they will not give off large quantities of poisonous or offensive gases.

Tests Employed

"In certain European countries where regulation of the manufacture and use of explosives is recognized as a proper means of safeguarding life and protecting users of explosives from dangerous compounds that might be made and sold by persons not possessing sufficient knowledge or technical skill, all explosives intended for use in coal mining are subjected to test to determine their fitness for such use.

"In the United States, authority controlling the use of explosives lies with the legislatures of several states. Up to the present day the regulations in different states have been far from uniform and in many states have been inadequate. Accurate information in regard to the action of different kinds of explosive materials is necessary for efficient legislation, and such information has been nowhere available. It is to remedy this condition and provide accurate data in regard to explosives that tests of coal-mining explosives are being made by the Bureau of Mines. These tests serve to show which explosives are safe and which are dangerous for use in coal mining, and to determine such other properties of explosives as are of importance in the safe and efficient use of these materials.

"All explosives that satisfactorily pass such tests as shown that they can be fired in considerable quantities in explosive gas mixtures without causing ignition, and in addition possess such qualities of stability, etc., as make them reasonably safe to handle and transport, are termed permissible explosives. Only such explosives are deemed suitable for use in coal mines in which dangerous quantities of fire damp or inflammable coal dust are likely to be met.

"Permissible explosives of most varied composition have been prepared, but in all of them the explosive power is due to the reaction of oxygen with combustible elements, such as carbon and hydrogen, the composition of the explosives being such that the temperature resulting from this combustion is not too high, nor so long continued, as with ordinary explosives. Any inflammable gas mixture can be ignited either by a very high temperature acting for a short interval of time, or by a lower temperature acting through a longer space of time; but if a low temperature only is produced by the explosive, and this temperature is of very short duration, the ignition of the explosive gas mixtures is much less likely. Accordingly the problem of making explosives for use in coal mines is seen to be, in its simplest form, the making of an explosive, that, although producing a low temperature of short duration, shall nevertheless produce a sufficient quantity of gases, and at sufficient pressure to perform by their expansion the work for which the explosive is intended. Through scientific studies and experimentation, manufacturers of explosives have found ways of obtaining this result. Nitroglycerin, ammonium nitrate and other well-known explosive materials are combined with various substances so as to form explosives that, when properly used, so greatly diminish the risk of accidental ignition of fire damp or coal dust that it may be said to be practically eliminated."

A gravel-washing apparatus for supplying concrete aggregate from suitable excavated material was constructed by a small addition to the mixing plant on one of the bridges of the Cleveland Short Line Railway. Two inclined timber tables were set beside the storage bin, one above the other, and dipping in opposite directions, so that material would run from the first onto the second and thence to a pit under the bin. A grating was placed at the foot of the first incline to prevent large stones or other matter from falling to the lower one. In the operation of the plant the excavating clam-shell bucket dumped on the top incline or table where a hose played on the material and washed it down to the second. Large pieces were screened out in passing, while fine sediment and light foreign matter were taken up by the water and carried off to one side. The clean gravel and sand collected in a pit at the foot of the inclines. A bucket elevator lifted the washed material to a revolving screen above the bins.

Leakage in Subaqueous Tunnels

Data on leakage of subaqueous tunnels is given by Mr. Edmund S. Davis, chief engineer of the Boston Transit Commission, in his last annual report. According to the figures presented, the North River tunnels of the Pennsylvania Railroad in New York are first in point of water-tightness, the leakage in them amounting to 0.0005 gal. per cubic foot of interior volume in 24 hours. The Detroit River tunnels, at Detroit, are next with 0.0027 gal.; the East Boston tunnel under Boston harbor, 0.0030 gal.; the East River tunnels of the Pennsylvania Railroad, in New York, 0.0035 to 0.0070 gal.; the St. Clair River tunnel at Sarnia, Mich., 0.0080 gal.; the Battery tunnel under the East River in New York, 0.0102 gal., and the Hudson-Manhattan rapid-transit tunnels under the North River in New York, 0.0125 gal.

It is observed that all of the above tunnels except the East Boston tunnel have shells of cast-iron or steel plate, calked to lessen leakage. In the Detroit River tunnel a calked steel-plate skin is employed, with inner and outer walls of concrete 20 and 36 in. in thickness respectively.

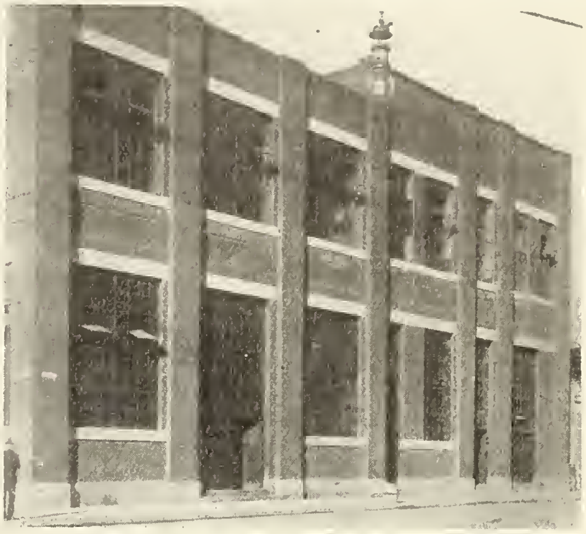
Discussing particularly the East Boston tunnel, Mr. Davis points out that the cost was less than that of the other tunnels referred to. Grouting of shrinkage cracks and other relatively porous places where small leaks occur in the arch and upper side walls has been continued throughout the length of that tunnel, from Atlantic Avenue in Boston to a point near Webster Street in East Boston and many of the leaks have been stopped. A special German iron-ore cement has been used for this purpose, 16 cubic yards of the grout having been forced into the porous places. So far as known this special cement is not affected by salt water.

Eaton Power Plant, Winnipeg

IN the isolated power plant which provides light, heat and power for the departmental store of T. Eaton & Company in Winnipeg there are a number ot features of more than ordinary interest to the builder as well as to the engineer. The first of these to strike the eye of the visitor is the liberal allowance of room, the large number of windows, and the general appearance of excellence. This plant is housed in a brick and steel building occupying a lot 100 feet by 120 feet on the corner of Graham avenue and Hargrave street, and is opposite the shipping rooms of the store, which occupies the entire block. It is connected with the store basement by a tunnel under Hargrave street. The foundations of the building, and the walls, are so designed that the building can be increased to a height of seven storeys, of which only two have been built as yet. Concrete footings are provided below the basement floor level and on these are set the cast iron columns which with the connecting I-beams make the skeleton of the building. An area extends under the sidewalk on two sides of the building and under a paved lane in the rear of the building. The sidewalks are supported on I-beams fastened to the main steel work of the building and on columns on the street side of the area. The basement is 13 feet from floor to ceiling, the engine room floor 25 ft., and the second floor 20 feet. The walls are finished with red pressed brick, interior and exterior, and the engine room has a 6 foot wainscoting of white enamelled brick. The floors are all reinforced concrete, and in the engine room are covered with red tile. The windows, which are exceptionally numerous, have Fenestra sashes and are glazed with wired glass. The doors are steel-kalamined with wire glass panes, and it may be interesting to note that the only wood entering into the construction of the building is under the steel covering of the doors. A freight elevator of 5000 pounds capacity is installed. A steel stairway with steel treads connects the different floors.

Brick Chimney at Eaton Power Plant

Another feature that adds to the appearance of the plant is the neat looking brick chimney. This is 198 feet high, 7 ft. 6 in. internal diameter, and rests on a foundation 36 ft. square by 6 ft. 0 in. deep. This foundation is of concrete reinforced with 1-in. twisted steel bars. The total weight is 420 tons and there are 119,400 bricks of the perforated radial type. This was built by the Canadian Kellog Company.


Eaton Power Plant, Winnipeg

Fire tests of treated and untreated timber, described by Mr. B. S. Hinkley, engineer of tests of the New York, New Haven and Hartford Railway in a memorandum to a committee of the American Railway Bridge and Building Association, led the investigators to the conclustion that cresoted sleepers ignite more readily than untreated sleepers, burn more fiercely and possibly longer, but with much less detrimental effects. He states that the wood of the creosoted sleepers is protected by a film of carbon or soot formed in the burning of the creosote, while in the case of untreated wood the fire works in farther. In the rating of the sleepers as to fire-resisting qualities, creosoted wood is named first, untreated oak second and untreated chestnut third. Both laboratory and service tests were made. In the former, a flame of standard size was impinged on 6-in. x 6-in. by ¼-in. and 4-in. by 4-in. by ¼-in. slabs, and live cinders were allowed to act on 6-in. x 6-in. by 4-in. blocks. Service tests were made on sleepers in the track by pulling the fires of locomotives on them and by igniting amounts of oil-soaked waste on them.

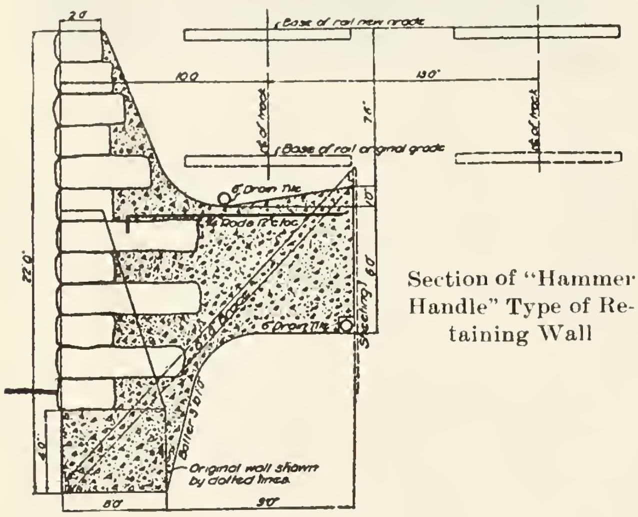
Shield tunnelling through silt between New Jersey and New York cost the Hudson & Manhattan Railroad interests $144 per lineal foot or 79 cents per cubic foot of internal bore, according to Mr. C. M. Jacobs, and cost the Pennsylvania Railroad Company $256 per lineal foot or $1.04 per cubic foot. Similar work could be done at a lower unit price now, he also said.

Retaining Wall of Unique Type

By W. C. Armstrong

THE accompanying drawing illustrates an unusual section of retaining wall which was built during the construction of the new Chicago & Northwestern Railway terminal station, Chicago, Ill., along the Wisconsin Division tracks for a distance of about one-quarter mile. These tracks were eleated some years ago, and were part of the old right-of-way; but, as at that time the streets were all depressed and a maximum clear headroom of only 12.5 feet was given, a further elevation became necessary to connect these tracks with the new terminal tracks, where 14 feet of headroom was given without depression.

The old retaining walls were built of rubble limestone on a natural cement concrete base. The face of the wall was vertical and on the right-of-way line. Outside of this line was private property. There was no projection of the concrete footing beyond the face of the wall. The base was too narrow to permit of raising the wall higher by additional masonry, and the natural cement concrete had disintegrated so badly in places as to be unfit for sustaining a greater pressure. Furthermore, to have excavated for a new base of a standard wall of the proper width for the increased height, would have necessitated either the temporary removal of two tracks or the use of very heavy shoring to hold back the embankment. The former was objectionable, for the traffic was heavy at this point, and it was desired to avoid increasing the congestion as much as possible. The latter was also objectionable on account of the cost of that the work would involve and the danger that would attend any scheme for shoring in such a restricted space; for it must be remembered that shores could not be placed outside the right-of-way line. It was impracticable to rebuild the wall entirely of concrete, unless the face was set back from the right-of-way line a distance equal to the thickness of the forms; for in many places houses were built snug up against the face of the old wall.



Section of "Hammer Handle" Type of Retaining Wall

To meet these conditions, a special type of wall was designed and constructed. One track was temporarily removed, and the sand filling excavated as shown. The old wall was then removed entirely. The concrete footing under the toe of the wall was then put in place. The face of the new wall was built of stone from the Duck Creek quarters in Wisconsin. This is a dolomite limestone of a very good quality for heavy masonry if protected from percolation of water; but, like all limestones, it will disintegrate more or less when used in damp places and subjected to freezing and thawing.

The face of the wall was laid with alternate headers and stretchers, while the backing was of concrete. No headers were allowed to be used with tapering points; and if a header was wider at one than at the other, the narrow end was made the face. In that way the header was dovetailed into the concrete backing.

The heel of the wall was at a considerable distance above the toe, and the peculiar form shown in the figure was given to the rear portion. "Hammer Handle" is the nickname that has been applied to this construction, suggested by its peculiar shape.

The thickness of the tail was usually made about 5 feet at the shallowest point, which was about 5 feet from the rear end. The upper surface of the tail was given a concave finish to facilitate drainage. A 6-in. tile drain was laid in the trough formed, which carries the water to manholes at the street lines connected with the city sewers. Six-inch drains are also placed under the heel of the wall, which connect with the same manholes.

In order to bind the tail more firmly to the body of the wall, and to prevent rupture through the tail, due to the downward pressure on the upper part of the wall, ¼-in. reinforcing bars spaced 12 inches apart were placed horizontally within about 6 inches of the upper face of the tail. These bars were bent down at one end, and anchored into stone headers.

Careful records have been kept since the completion of these walls and the resumption of traffic on the tracks over them, but no movement of any kind has been detected. Some of them have now been in use nearly a year.

It has occurred to the writer that there is one feature of this type of wall that might frequently be employed as a measure of economy. That is, the saving in excavation and masonry effected by setting the foundation of the heel higher than the foundation of the toe. There are usually but two reasons for carrying the foundations of a retaining wall lower than the surface of the ground. The first is to reach a material that will sustain a greater pressure; and the second, to get the foundation below the action of frost. The first is usually necessary only under the toe of the wall, for almost any good soil will sustain the heel pressure. The second also is necessary only under the toe, for the heel is protected from frost by the embankment.

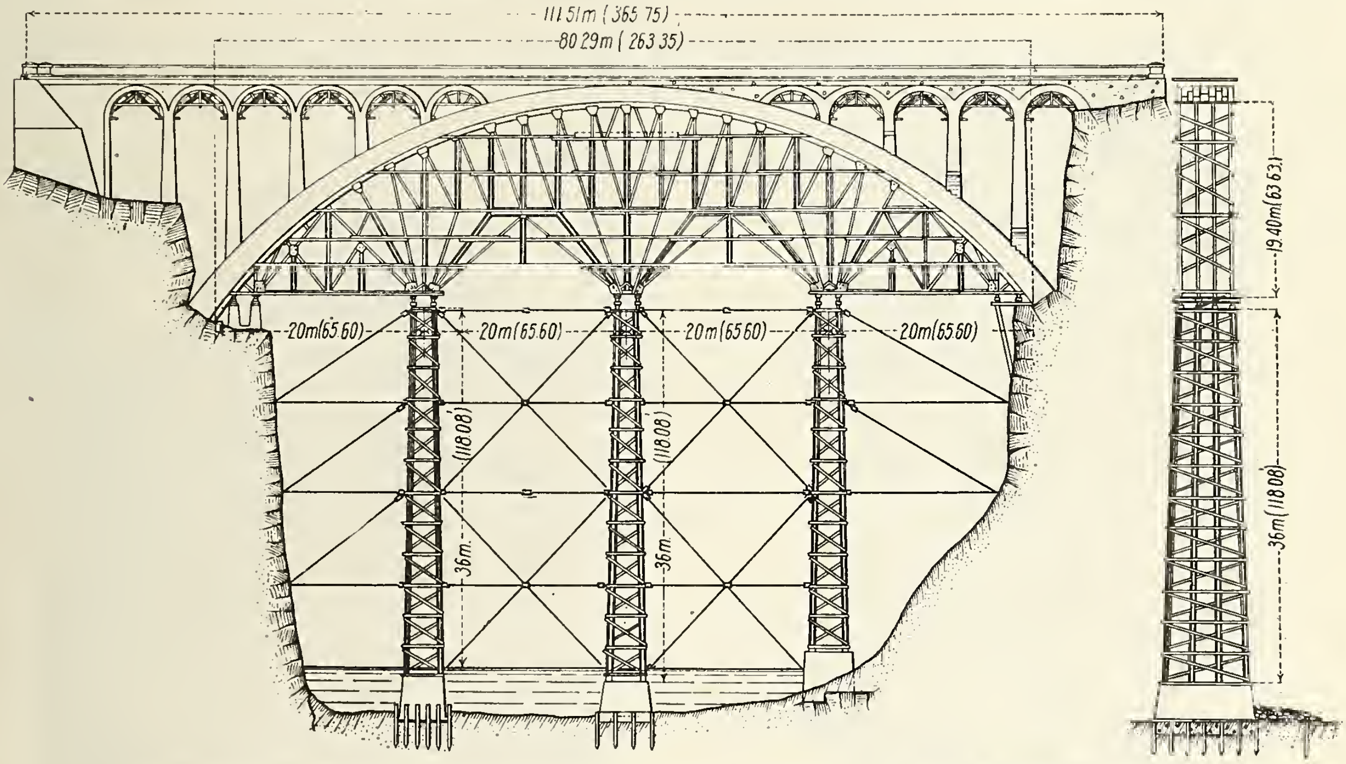
At Hamburg there are two bridges, the masonry of which was threatening to fall in ruins, being traversed by innumerable cracks of varying size. A remarkable process has just been made use of to rejuvenate these bridges. A number of holes were bored throughout the structure so as to give access to the interior and cement was injected by pumps under pressure. Reports on the present condition of the two bridges are favorable.

In heating materials in cold weather much expense may be saved by care in getting the concrete into place at a temperature of 100 to 125°. Heat used in the beginning is far more efficient than five times the amount expended in coke in trying to heat and cure the concrete which is placed in position cold.

Arch Centre Construction for a Masonry Arch in France

American engineering exhibits very few long span masonry arch bridges as compared with that of Continental Europe. With the advent of concrete masonry even the limited performance of the past seems likely to be greatly curtailed on this continent. The masonry arch on the contrary still frequently calls for the attention of the European bridge builder. Among recent examples of European masonry arch construction is the structure outlined in the accompanying drawing which was built in 1909 across the Valserine, a small tributary of the River Rhone. The nearest town of size is Montangeo, which lends its name to the new bridge.

The Montangeo arch has a clear span of 80.29 m. (263.35 ft.) and a rise of 20 m. (65.6 ft.) or one-fourth the space. This arch ring is 1.5 m. (4.92 ft.) thick at the crown and 2.6 m. (8.53 ft.) thick at the springs, which it may be noted, are at different elevations, that on the right bank being 1.14 m. (3.74 ft.) lower than that on the left bank. This difference results from the necessity of going deeper for solid rock bearing on one side than on the other. The main arch ring is surmounted by eleven spandrel arches which carry the machinery. All parts of the bridge are of stone masonry, the main arch ring having cut stone facing and rough stone backing.



Elevation and Section of Timber Centre for 263-ft. Masonry Arch near Montangeo, France

The main arch was built up in three rings on the haunces and in two rings on the crown section. Each ring was constructed in eight segments which were placed simultaneously two and two advancing from each spring toward the crown. The material was handled by a cableway which spanned the gorge.

The main feature of interest in this construction of this arch was the center which is shown clearly in the accompanying elevation and section. The arch being solid a fixed centering was of course employed. It, therefore, differs in character from recent large arch centers which have been used in America at Walnut Lane, Rocky River and Spokane. All three American bridges were of parallel twin arch type, and the centers were designed to be used for one arch and then shifted sidewise for use under the parallel twin arch.

The Montague's arch center was supported at the ends and also by timber twins at three intermediate points so as to bring the supports 20 m. (65.6 ft.) apart. The timber towers were six-leg structures braced as shown and finished on masonry pedestals. They were tied horizontally and diagonally to each other and to the rock banks by steel rods and were also guyed up and down stream. As this drawing shows only the general framing and bracing arrangement, some of the dimensions and details may be properly described more fully.

Two of the towers were 36 m. (118 ft.) and the third was 33 m. (108 ft.) high; the lateral dimensions were the same for all at the base, viz., 2.33 x 5.47 m. (76.42 x 179.4 ft.) and the butter towards the top was the same, 2 centimeters per meter, for all. The tower legs were 33 cm. (12 ins.) square for timbers and were braced together horizontally every 8 to 10 feet as shown. The rods tieing the towers together and to the banks were 2 cm. (0.8 in.) in diameter and were provided with turnbuckles.

The center proper consisted of four ribs spaced 1.6333 m. (5.36 ft.) apart and braced together laterally. These ribs were supported on the towers and banks by two lines of sand boxes for each support. Both towers and centers were carefully calculated. They settled very evenly under load and no trouble was had in striking them.

The total cost of this bridge was 355,000 francs or say $71,000. This figures cost about $10 per square foot of top plan or $200 per linear foot of structure over all. We are indebted to Le Genie Civil and to Engineering & Contracting for the data used in this description.

Canadian Railroad Development

It is announced that the Quebec Government will subsidize, by land grants, railway construction in the province, including the proposed lines to James Bay. The Government desires to open up the northwestern portion of the province by the building of colonization roads, particularly in the Abitibi and Temiskaming districts.

Among the large contracts that have recently been awarded by the engineering department of the C. P. R. at Winnipeg may be mentioned that for the construction of an express building and freight sheds at Saskatoon, let to Mr. J. H. Simmons, Winnipeg. Another contract is for a 6-stall engine house and express building—awarded to Messrs. J. McDiarmid Company, Winnipeg.

Notice of a subsidy of $12,000 a mile to the Canadian Northern Pacific Railway was given last week at Ottawa by the Minister of Railways. The line is to be 525 miles long, extending from the Yellow Head Pass to Vancouver. The terms of the subsidy provide that the line shall be commenced within two years from August 11, 1912, and completed within reasonable time, not exceeding four years.

Railway and bridge subsidies brought down at Ottawa last week totalled nearly $23,000,000. This amount provides for 3,433 miles of railroad, the construction of which, at the maximum rate of $6,400 a mile, will involve Government aid amounting to $22,000,000. The additional bridges involves over $9000,000. Of the total railway mileage subsidized 1,882 miles are renewals of former votes, the subsidy amounting to $12,044,808. There are 1,551 miles of new line authorized to receive subsidies.

It is understood that the C. P. R. contemplate the expenditure of $2,000,000 upon terminal improvements at Vancouver. The plans include the erection of a new passenger depot east of the present station, as well as the construction of overhead approaches to the company's wharves at Granville and Burrard streets. The latter is contingent upon the city's building in conjunction with North Vancouver a subway for foot passengers under the C.P.R. tracks at Columbia avenue, as well as a vehicular subway in the same section.

The contract for the construction of the new C. P. R. line through Eastern Ontario from Leaside Junction to Glentae, Ont., was awarded last week to Messrs. Deeks and Hinds, of Toronto. The firm's tender was $10,000,000. Work on the road will be commenced forthwith. The new line, starting from Glentae, a few miles from Smith's Falls, will in a way establish a double-track between Montreal and Toronto. At the present time the C. P. R. has a double-track from Montreal as far as Glentae, but instead of doubling along the right-of-way of the present track from Smith's Falls to Toronto, the company has decided to follow the course around the lake, and the new line from east to west will be 198 miles long. It will run parallel with the Grand Trunk and the Canadian Northern lines and is to be in running order by December, 1913, and completed in July, 1914. The contract calls for all grading, construction work, bridge building, etc., and the work will be laid out so as to allow for a double-track along the same route when the demands of the company justify it.

Important plans for the development of the Intercolonial Railway are stated to be under consideration by the Government. One involves the double-tracking of the system from Montreal to Halifax. This would be a lengthy and expensive work, but would place the railway in a very advantageous position for securing and holding a heavy share of the freight and passenger traffic to and from the seaboard. It is also proposed that the Government reduce the grades of the line. In connection with the extension of the trackage of the road, it is likely that a loop will be constructed from Parsboro' to the Minas Basin and thence to Truro. These alterations would be followed by an arrangement under which running rights into Halifax would be given to the three transcontinental railways. If this project is carried out, it will be necessary to extend the terminal facilities at Halifax, to construct new and larger docks, etc., involving an expenditure of many millions. Appropriation for the beginning of this work at Halifax will probably be made in the Estimates to be laid before Parliament next session.

Points at issue between the city of Vancouver and the C.P.R. regarding the proposed subway beneath the company's tracks at the North Vancouver ferry crossing, and matters in connection with the Georgia-Harris street viaduct were discussed recently by a civic committee and a number of prominent C. P. R. officials. As regards the Georgia-Harris street viaduct, the only point at issue is the location of the supporting piers of the viaduct. Some time ago, when the preliminary negotiations were concluded between the city and the C.P.R. for the land necessary for the piers, provision was made for their location. Since then, however, the C.P.R. has made changes in the plans and location of its tracks in the local freight yards, rendered necessary by the ever-increasing traffic. Slight changes will be necessary from the original location of the piers and when City Engineer Fellowes and Division Engineer H. Randall get together to decide on the technical details it is expected that everything will be satisfactorily arranged, and operations commenced as soon as possible. The undertaking which the C.P.R. wish to have commenced as soon as possible, however, is the proposed subway at the foot of Columbia avenue, affording access under the company's track to the North Vancouver Ferry landing, Evans, Coleman & Evans, and adjacent wharves. This subway, which will start on Columbia avenue, a short distance north of Alexander street, will dip under the C.P.R. tracks and then branch into two approaches. One of these will turn eastward, affording access to the ferry landing; the other will turn westward and provide communication with the wharves in that direction. There are a number of minor questions regarding grades, width of roadway and accommodation for pedestrians, that will have to be arranged by a joint conference between the engineering departments of the city and C.P.R. to be held during the next few days. It is expected that the details will all be satisfactorily arranged within a week or so and that arrangements will be made to have construction commenced on the subway early in the spring.

Regina Water Supply

Mr. R. O. Wynne-Roberts, M. Inst. C.E., has been retained by the city of Regina to carry out works which provide for an ultimate supply of 10,000,000 gallons daily and are expected to cost nearly $1,500,000. The scheme has for its object the connection of several watersheds into one trunk main, and the works are designed so that they may be carried out in sections, as the council deems necessary.

Mr. Wynne-Roberts, who has been investigating the sources for supply for several months past, states that 7,000,000 gallons of water are available daily, providing the system is extended, but he points out that this quantity would be insufficient to meet the demand if the growth of the city continues at its present rate. In his opinion the proper course is to take immediate steps to render the present supply sufficient for a population of 75,000 persons, or, in other words, to prepare a supply for two and a half times the present population.

The scheme outlined by Mr. Wynne-Roberts in his report provides for the laying of 40 miles of pipes—steel and earthenware—the erection of a central pumping station and water softening plants, and the construction of four reservoirs.

There are no catchment areas in the southern quarter of the city, and no large sources of supply are to be found west of the city. On the northern quarter there is considerable water available, but the main sources of supply are said to lie on the eastern side of the city. The report deals in the utmost detail with the supplies of water available from the various springs. The supply to the city will be maintained at a pressure of about 65 lbs. to the square inch—or about 150 ft. head, which will be sufficient to reach the highest buildings, and it will be possible to work under a greater pressure when necessary.

One of the most interesting and readable features of Mr. Wynne-Roberts's report is a chapter devoted to the geological formation of the country, due mainly to the action of the huge glacier which covered a large area of the North-west 10,000 years ago.

Noteworthy Building Work at Vancouver, B.C.

The new Rogers Building at Vancouver, which measures 120 feet on Granville street and 104 feet on Pender street, is undoubtedly an architectural acquisition to the city. Reinforced concrete has been used throughout, the walls being faced with terra cotta. A feature of the building is a spacious main entrance vestibule on Granville street. All the corridor floors and dados are marble. The corridor partitions are executed in terra cotta tile. The inside finish is quartered oak throughout. The building contains 350 offices, while there are eight large stores on the ground floor and a barber shop, cafe, etc., in the basement. The Durham system of plumbing has been installed. The building is steam heated. Messrs. Gould & Champney are the architects and Messrs. Purdy & Henderson, the contractors.

Rogers Building, in course of construction

Bank of Ottawa Building, recently completed

Two of Vancouver's Latest Office Buildings

The 10-storey block which is being erected in Vancouver for the National Finance Company, Limited, by Messrs. Adkinson & Dill, is nearing completion. The building is of reinforced concrete construction throughout, faced with sand and lime pressed brick. The first floor facings are of artificial limestone and granite, and the main entrance is now being finished in ornamental plaster and Alaskan marble. All of the partitions are to be of fireproofing material. The heating will be the low pressure steam system. The estimated total cost is $108,000. ·Mr. Thos. Hooper, of Vancouver and Victoria, is the architect.

Bank of Ottawa Building, Vancouver

One of the newest additions to Vancouver business district is the Bank of Ottawa Building, a photograph of which is produced herewith. This building is of reinforced concrete construction. It covers an area of 6,240 feet and is eight storeys high, with full basement. The cost of the construction was $250,000. The walls are of stone, brick and terra cotta, the first storey of selected sandstone, and above that to the roof, pressed brick and terra cotta. The floors are of reinforced concrete, and the entire building is sanitary and absolutely fireproof. The main entrance is finished in marble, and the corridors are finished with a specially designed wainscoting, four feet in height with attractive marble base, while the floors are laid in rich ceramic mosaic tile. This building contains 112 offices of varying size. These are equipped with hot and cold water, and electric light, and are furnished with vaults. The heating is the Webster Modulating system. Two electric elevators running at a speed of 350 feet per minute render satisfactory service. A vacuum cleaning system and janitor service complete the equipment. Messrs. Somervil & Putman are the architects and Messrs. McDonald & Wilson the general contractors. The Canadian Ferro-Concrete Company, Limited, completed the structural part of the building.

A new brick concern, the Dominion of Canada Brick Company, has been incorporated with a capital of $1,000,000. The head office is in Montreal.

Personal Mention

Mr. C. H. McMillan, general superintendent of the Dominion Steel Company, has resigned, after a service of five years.

Mr. David D. Drummond, Vice-President and Manager of the Chicago Portland Cement Company, died at his home at Oglesby, Ill., on Friday, March 8th.

Mr. H. Hadley, engineer of Verdun, P.Q., and Mr. A. B. Gibeau have registered at Montreal, as manufacturers and agents, the Automatic Sidewalk Sand Spreader Company.

At the noon-day talk of the Montreal Builders' Exchange on March 20th, Mr. Joseph Perrault, architect, spoke on his reminscenses of a trip to Europe. Mr. T. Gilday presided.

The New President of the C. N. A. B. E.

Mr. J. W. Morley, Winnipeg
President Canadian National Association
of Builders' Exchange

Mr. J. W. Morley, who was elected president of the Canadian National Association of Builders' Exchanges at the sixth anunal convention of that body, held recently in Toronto, has seen a good deal of the phenomenal building development of the West during the thirty years that he has resided in Winnipeg. Mr. Morley has been in the painting and decorating business for the last eighteen years and has been markedly successful in that field. From a comparatively small beginning, Mr. Morley's business has grown until he has found it necessary to take two of his sons into it under the firm name of J. W. Morley & Sons.

It is a tribute to Mr. Morley's executive ability that he has been honored with many responsible positions in various societies. The present year Mr. Morley may well call his "convention" year, for not only has he been elected to the principal office in the C.N.A.B.E., but he was also made president of the International Association of Master House Painters and Decorators of the United States and Canada, at their annual meeting at Rochester, N.Y., in February. One would think that the responsibilities of two such Associations as these would be somewhat of a tax upon a busy Westerner, but Mr. Morley has an inordinate love of work and a wonderful capacity for achievement. In spite of his national and international presidential duties he manages to do good work for the Winnipeg Builders' Exchange, of which he has been president for two years, and also for the Master Painters' Association of Western Canada, of which he is also president.

Mr. C. W. P. Ramsey, who has been in the employment of the C. P. R. for many years, has been appointed engineer of construction for eastern lines with offices in Montreal.

At the annual elections held recently at the School of Practical Science, Toronto, Mr. J. E. Ritchie was elected president of the Engineering Society, and Mr. W. P. Curtis first vice-president. The corresponding secretary is Mr. C. C. Rous.

Mr. D. Chene, the former city engineer of Hull, Que., is one of the incorporators of the newly organized International Supply & Construction Co., Ltd., which has been formed at Hull, Que., with a capital of $100,000, to carry out railway, canal and dock construction.

On March 15, Mr. John R. Rablin, M. Am. Soc. C. E., Chief Engineer Massachusetts Metropolitan Park Commission, delivered an illustrated lecture on "The Construction and Maintenance of Park Roads," before the graduate students in Highway Engineering at Columbia University.

Mr. E. L. Cousins, Engineer to the Harbor Commission of Toronto, left the Queen City last week for a two weeks' tour of the United States harbors along the Atlantic coast. He will be accompanied during part of the tour by Mr. J. G. Sing, District Engineer of the Department of Public Works.

The City Engineer of Victoria, Mr. Angus Smith, has resigned after two years' service. It will be remembered that Mr. Smith was formerly City Engineer of Regina. He is a graduate of the School of Practical Science, Toronto, and was formerly in private practice at Ridgetown, Ont. Later he became City Engineer of Stratford.

The Hon. E. E. Tache, Deputy Minister of Crown Lands & Forests, Quebec, died in that city on March 13th, aged 76 years. He had been in the service of the Provincial Government for over fifty years and had served under thirteen ministers. Last year, on the occasion of his jubilee of service, he was presented with an address and a piece of statuary. Mr. Tache was the designer of the Parliament Buildings and other structures in Quebec.

Annual Dinner Engineers' Club of Toronto

The annual dinner of the Engineers' Club of Toronto was held at their headquarters, 96-100 King street west, on the evening of Thursday, March 21. The Chairman of the evening was Mr. Willis Chipman, the President of the Club, while the office of Toastmaster was deputed to Col. Hays, who fulfilled the requirements thereof to everybody's satisfaction. The speakers included President Chipman, who gave a brief but interesting review of the history and work of the Club, Dean Galbraith, City Engineer Rust, Mr. A. F. Macallum (City Engineer of Hamilton) and Dr. Ellis, Professor of Applied Chemistry at the School of Science. The speeches were interspersed with musical numbers. The attendance numbered about 75.

Arrangements are being made by the Norton Griffiths Steel Construction Company, Limited, located in Vancouver, to have the property between the site of the Great Northern Railway Docks and the B. C. Sugar Refining Company on Burrard Inlet made into a contractors' yard, where machinery, wagons and other supplies may be stored and kept in repair. This property is 390 feet in width. It is the intention of the company to construct a pier 280 feet into the Inlet, to be used as store room, and later on to extend this space as necessity requires. It is expected that work on the new yards will start immediately.

Construction News and Notes

At a meeting of the Amalgamated Carpenters' Union in Toronto last week it was decided to demand a minimum wage of 45 cents an hour.

Calgary, Alta., will establish a civic asphalt plant. A by-law to raise $20,000 for the purpose of equipment will be submitted to the ratepayers.

Up to date some two hundred plans have been received for the new University buildings to be erected at Point Grey, B.C. The successful architect will receive an award of $10,000.

The county clerk of Welland, Mr. Robt. Cooper, invites applications until April 2nd for the position of county engineer and county road superintendent. Applicants are asked to state their experience and qualifications.

The town of Beauharnois, P. Q., has passed a resolution to borrow $50,000 to pay for macadamizing its roads. With the sum to be contributed by the Provincial Government, a fund of $100,000 will be available for this purpose.

The city of Edmonton, Alta., is looking forward to the best building season in its history. The various architectural firms are all very busy. One firm alone, Messrs. Magoon & MacDonald, have commissions for work representing a value of $700,000.

It is understood that the supplementary estimates which will be brought down shortly in the House at Ottawa will contain an appropriation of at least one million dollars for preliminary work in connection with the improvement of the Welland canal.

Messrs. Baynes & Horie, contractors, Vancouver, report good progress in the erection of the 6-storey hotel building in that city which is being erected for Mr. F. W. Padmore, according to plans prepared by Mr. J. R. MacDonald. The cost is placed at $60,000.

Of the more recent incorporations at Winnipeg we note the Waite-Fullerton Company, Limited, organized with a capital of $20,000, to deal in all kinds of building materials. The incorporators are Messrs. H. S. Waite, R. Fullerton and Jno. Mahood, all of Winnipeg.

The Norton Griffiths Company, who have the contract for the extensive harbor works at Courtenay Bay, are making active preparations for the commencement of operations. One of their plans is to establish a large cement plant for which they have already laid out the ground.

Exceptional activity in residential building is reported at Hamilton, Ont. It is estimated that $2,000,000 will be spent in new dwellings this season. Plans have been prepared for a number of homes ranging in cost from $3,000 to $18,000, while several apartment houses are also planned.

The February building permits for the 28 leading Canadian cities totalled $7,773,284, compared with $3,591,006 for February, 1911—an increase of 85.9 per cent. The more notable increases came from the West. Victoria, New Westminster, Brandon, and Saskatoon had increases ranging from 800 to 400 per cent.

Finishing touches are now being put on the new Labor Temple at the corner of Dunsmuir and Homer streets, Vancouver. The building is four storeys in height, of reinforced concrete construction. It was started in April of last year and its total cost will be approximately $125,000. The Norton Griffiths Steel Construction Company, Limited, are the contractors.

From Sault Ste. Marie, Ont., comes the important announcement that the charter of the Sault Dry Dock & Shipbuilding Company has been acquired by Mr. Clergue, and French and Belgian associates. The construction of the proposed dry dock will be commenced early in the spring It is understood that the new interests are planning the erection of a much larger plant than was formerly intended.

The appointment of a permanent industrial commission is being considered by the Minister of Labor, the Hon. T. W. Crothers, and it is quite possible that the necessary legislation will be brought down next session. The function of the body would be the adjustment of disputes between capital and labor and it would replace the conciliation boards now appointed from time to time under the Industrial Disputes Act.

The Quebec Provincial Board of Health has served an order on the Saraguay Electric Company to establish a filtration plant for the water supply at Bordeaux. Recently there were several cases of typhoid fever, and on these coming to the knowledge of the Montreal Board of Control, Dr. Lachapelle ordered a sample of the water to be analyzed, from which it appeared that this was the cause of the outbreak. The order referred to was in consequence served on the company.

With a view to securing a larger attendance at the monthly meetings of the Province of Quebec Association of Architects, Montreal, the council have followed the example of the Builders' Exchange, and have arranged for the papers to be read at mid-day luncheon. These are in place of the evening meetings, at which the attendances were disappointing. The first lunch talk took place on Tuesday, March 19, at the St. Lawrence Hall, with Mr. Venne, the president, in the chair. Some of the principal architects of the city were in attendance. Prof. Jules Poivert, of the Polytechnic School, read a paper on "French Apartment Houses."

The construction of a large sewer in Montreal has just been completed at an expenditure of $350,000. It has been laid for 2½ miles between Beaudry and Guy streets, along Sherbrooke street. Five and six foot diameter pipes have been used and in some parts the pipe is forty feet below the street level. On Guy street there was a depth of thirty-six feet of solid rock to be bored, a task which took many weeks. All the excavation work was done by a Carson excavator. The laying of the sewer was done by Messrs. Matthew Dineen, L. Giguere and Company, Hefferman & Beck, and Keegan & Dillon, each firm contracting for a section.

Under a decision of the Montreal Council, last year, to insert a fair wage clause in all municipal contracts, a schedule has been drawn up by Mr. R. Bolte, inspector of wages, and approved by the Board of Control. The following is the schedule, which applies to a nine-hour day: masons, 45 cents an hour; bricklayers, 50 cents; structural iron workers, 35; ornamental iron setters, 30; plasterers, 45; lathers, 45; hoisting engineers, 25; tile setters, 45; plumbers and steam fitters, 37½; plumbers' helpers, 15; carpenters, concrete forms, 35; stone cutters, 45; marble cutters and setters, 40; painters, 30; sheet metal workers, 35; roofers, 35; electrical wiremen, 27½; cement finishers, 45; builders' laborers, 22½; ordinary laborers, 20; carters (single), $3.15 per day; carters (double), $5.50 per day.

In presiding over the annual meeting of the Canada Cement Company, held in Montreal, on March 7, the Hon. W. C. Edwards spoke of Mr. Jones, the general manager, in very high terms. The chairman alluded to what he termed the unjust criticism and unfounded hostility to the company, and denied that the concern was directed in the interests of capitalists. The aim of the directors was to unify the price of cement in the country; this had already been done east of the Great Lakes. On account of the recent coal strike which compelled the company, although located near the greatest coal fields on the continent, to import coal, the price west of the lakes was somewhat higher than in the east and would probably remain so, but as far as the policy of the company was concerned it would remain the same in the west as in the east.

There was a good attendance at the second annual convention of the Provincial Builders' Association of Alberta, held recently at Lethbridge. The constituent exchanges are those of Calgary, Edmonton, Medicine Hat and Lethbridge. The delegates were welcomed by His Worship Mayor Hatch, who predicted a record building year for the province of Alberta and spoke of the growing importance of the Association's work. Reports were submitted by the delegates from the various exchanges which were represented at the annual convention of the Canadian National Association of Builders in Toronto. The president of the Association, Mr. H. J. Goode, of Lethbridge, Alta., was in the chair. The principal business transacted was the appointment of a committee to draft a uniform form of contract to be used throughout the province.

One of the features of the building work in Montreal this year is the number of large offices to be erected in the down-town district. The readiness with which accommodation in the Transportation and Dominion Express buildings was rented weeks before their completion, has induced capitalists to favor projects for additional offices, especially in view of the strong demand and the great increase in rents. Three or four of the structures to be started this year are planned to be ten storeys high, the latest skyscraper being one to be erected at the southeast coner of St. John and Hospital streets. It will have a frontage of 120 feet on St. John street and one hundred feet on Hospital street, and the cost will be in the neighborhood of a million dollars. Mr. Kenneth Rea, of Montreal, is the architect. Boring work is now proceeding in order to test the strata, with a view to ascertain the nature of the foundations which will be required. The strata of Montreal varies to a remarkable degree, and as no buildings of the character contemplated have been erected in this immediate district, these borings are being made. The structure to be put up will have a steel frame, with either a stone or terra cotta facade; it is to be fireproof, and equipped with express elevators and freight hoists. Four old buildings will have to be demolished, and the work of clearing the site will be commenced as soon as the tenants remove, after the 1st of May. The new building will be erected by the W. J. Lewis Estate.

Programme of C. P. R. Construction in Western Canada

The Dominion Government has authorized the construction by the Canadian Pacific Railway of the following new lines in Saskatchewan and Alberta: From a point at or near Hawarden on its Moose Jaw northwestern branch to a point at or near Floral, or Cheviot, on its Pleasant Hills branch or to a point between these two places in the province of Saskatchewan. From a point on its Estevan-Forward branch in township 2 or 3, range 12, 13 or 14 west of the second meridian in a westerly and northwesterly direction to a junction with its Weyburn-Lethbridge branch in township 5 or 6, range 25 or 26 west of the second meridian in the province of Saskatchewan. From a point at or near Cedar Lake on its Hardisty subdivision in a southerly direction to a point in township 39 or 40, range 11 or 12 west of the fourth meridian into the province of Alberta. In a northwesterly and northerly direction from a point on its line from Wilkie, authorized by paragraph (B) of section 3 of chapter 74 of the statutes of 1907 to a point near the north Saskatchewan River in township 51, 52 and 53, 54, 55, or 56, range 1, 2, 3, 4, 5, 6, 7 or 8 at west of the fourth meridian in the provinces of Saskatchewan and Alberta. From a point at or near Kipp on its Crows Nest subdivision in an easterly and northeasterly direction to a point in township 12 or 13, west of the fourth meridian in the province of Alberta. From the northwesterly terminus of the line from Asquith, authorized by paragraph (B) of section 3 of the statutes of 1910 in a westerly and northwesterly direction to a point at or near Battleford in the province of Saskatchewan. From a point at or near Dricana in an easterly and southeasterly direction to a point in township 20 or 21, range 11, 12, 13 or 14 west of the fourth meridian in the province of Alberta.

The Central Railway of Canada has completed all arrangements for a new station and terminals in Montreal, and has submitted its plans to the Railway Commission. The station will be located in the eastern part of the city. It is announced that the contract for the line between Montreal and Ottawa has been let and that active construction work will commence in the spring.

Fireproofing Impregnation Company Organized at Winnipeg

A recent incorporation at Winnipeg is that of the Canadian Fireproofing Impregnation Company, Limited, with a capital of $200,000, organized to manufacture and import fireproof paints and impregnation remedies. The manager of the new concern is Mr. Emil Muschik, who has had an extended practical experience in the Fatherland.

In a country like Canada, that possesses hundreds of thousands of wooden structures, the efficient fireproofing of wood is a most important field, and the new company will doubtless find a wide scope for their efforts. In a communication to the Contract Record and Engineering Review, Mr. Muschik points out that the annual fire loss in European countries is only about 30 cents per capita, compared with $2.50 per capita in this country. Canada's fire loss amounts to over $20,000,000 a year. To this total must be added the cost of fire insurance and of maintaining expensive fire departments. If the total fire losses and fire expense of both Canada and the United States were put together they would present the formidable figure of $500,000,000, a sum equivalent to the value of the continent's annual production of gold, silver, copper and petroleum.

As Mr. Muschik says, fireproofing impregnation is by no means new. For years it has enjoyed a more or less extended use in some of the older countries. But in Canada, where perhaps it has been needed more than anywhere else, its use has been very restricted. In not a few conflagrations, wooden houses have been ignited where they would have been saved if they had been covered by a thick coating of insulating material. The company mentioned above claim to have manufactured, in their preparation Antignol, an absolutely permanent fireproofing impregnation fluid, which is easily applied, and has a remarkable penetrating power, entering into the wood to a great depth. To increase the fire protection obtained from the application of Antignol, the company recommend that frame buildings should be painted with their fireproof Asbestos Paint, which is now being used with much success in Germany, and which the company is exclusively importing from that country. This paint is made in all shades and is no more expensive than the ordinary water paints.

In Western Canada, particularly, the Canadian Fireproofing Impregnation Company, Limited, should find an excellent field. There will always be a demand for temporary structures in that section, and if the company's products have that efficiency which Mr. Muschik claims for them they will doubtless enjoy a ready sale.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Bordeaux, Que.
This municipality has been ordered by the Provincial Health Authorities to instal a filtration plant for the purification of its domestic water supply.

Calgary, Alta.
The Commissioners recommend the submitting of by-law to provide $50,000 for sewer extensions. City Engineer J. T. Child.

North Toronto, Ont.
A by-law will be submitted to provide a pumping station on Summerhill avenue, Toronto, at a cost of $60,000. E. A. James, Engineer.

Ottawa, Ont.
Surveys are being made for filtration plant on Ottawa River, Lemieux Island. Engineer, N. J. Ker.

Peterboro, Ont.
The town is planning to pave the main streets and council would like to receive estimates on work and material. Mayor, Bradburn. Ald. Wm. Buller, Chairman Board of Works, Peterboro.

Port Arthur, Ont.
Tenders are called until April 8th for curb and gutter laying, 22,519 square yards of sheet asphalt, block or bitulithic, 766 lineal feet of curbs and gutter. Ten per cent. must accompany each tender. Engineer, L. M. Jones; City Clerk, J. McGleigul; Utilities Commissioner, J. J. Hackney.

St. Catharines, Ont. . . .
City Council contemplate paving to cost $11,000. City Engineer, R. D. Brown, St. Catharines. Plans and specifications may be seen at Engineer's office.

The city is planning the construction of vitrified brick pavement, Queen st., between Paul and Wing street; estimated cost $7,300. Bitulithic pavement, Queen street, from Lake avenue to Welland avenue, estimated $10,400. Bitulithic pavement, James street from Church street to Welland avenue, estimated cost $16,220. Bitulithic pavement, Lyman street, from Church street to Raymond street, estimated $5,000. Bitulithic pavement, Beecher street, from Raymond to Welland avenue, estimated $3,525. R. G. Brown, City Engineer.

Saskaton, Sask.
Tenders are called until April 5 for paving on certain streets. City Engineer, Geo. T. Clark.

Vancouver, B.C.
Tenders are called for construction of trunk sewer on Bridge street from 10th avenue to 16th avenue. Received by Clerk until April 2nd. Clerk, Wm. McQueen; City Engineer, F. L. Fellowes.

CONTRACTS AWARDED

Hamilton, Ont.
Waterworks intake to cost $20,520. Contract awarded to Carroll, Porter Boiler & Tank Co., Pittsburg, Pa., for —2200 ft. 48-in. steel intake pipe, $793 per ft.; 2 expansion joints at $305 each; 1 bulk head at $589; 3 flange specials at $128 each; 3 sleeve valves at $497 each. Mayor, G. H. Lees; City Engineer, A. F. Macallum.

Welland Ont.
The contract for paving in this city was awarded to Mr. C. H. Kaumeier, Port Huron, Mich., for Metropolitan Brick at $109,893.73. Others who tendered were Louis H. Gipp, Buffalo, N.Y.; Erie Contracting Co., Buffalo, N.Y.; Niagara Construction Co., Buffalo, N.Y.; Hurley & Lyne, Fredonia, N.Y.; Jno. F. Connolly, Toronto, and the Warren Bituminous Paving Co., Toronto. Mr. D. T. Black is Town Engineer of Welland.

West Toronto, Ont.
The McKnight Construction Co. have secured the contract for Tar Macadam paving from Humber bridge to Mimico at $10,000 per mile.

Winnipeg, Man.
Laying sewer, extension, $4,235.75. Engineer, H. N. Ruttan, 223 James ave. Contracts awarded to Thos. Jaskson & Son, Winnipeg, $2706.75; and Engineer of construction, J. W. Astley, City yards, Winnipeg, $1529.00.

Railroads, Bridges and Wharves

Calgary, Alta.
The Canadian Pacific Railway are preparing plans for stations at the following places: Vernon, Webb, Namaka, Winnifred, Seven Persons, Cline, Dunmore, Lougheed, Nevis, Frank, Galloway, Aldersyde, Burmis and Jaffray.

East Chezzetcook, Halifax County, N.S.
Tenders are called for construction of breakwater. Owner, Dept. of Public Works, Ottawa, Ont.; R. C. Desrochers, secretary. Plans obtained at the following offices: H. A. Russell, C.E., Halifax, N.S.; E. G. Millidge, C.E., Antigonish, N.S., or on application to the postmaster, East Chezzetcook. Received by secretary until 4 p.m., April 9th.

Goderich, Ont.
Tenders are called for extension to breakwater and dredging. Plans, etc., at Department, at offices of District Engineer at Toronto and Windsor and on application to local postmaster. Received by Secretary until April 15th. Department of Public Works, Ottawa; Secretary, R. C. Desrochers.

Kingston, Ont.
The ratepayers voted in favor of the purchase of the Cataraqui bridge. An appropriation has been promised by the Government and as soon as action is taken, work will begin on new bridge.

Lion's Head, Ont. (Bruce Co.)
Tenders are called for construction of extension to wharf. Plans, etc., at Department and at offices of District Engineers at Toronto, Windsor and on application to local postmaster. Received by Secretary until 4 p.m., April 16th. Dept. of Public Works, Ottawa; Secretary, R. C. Desrochers.

Ottawa, Ont.
Dr. Thompson, Dominion member for Yukon Territory, is urging construction of steam road from Haines Mission to Fairbanks, Alaska and branch to Dawson City. The matter will be considered by Department of Railways.

CONTRACTS AWARDED

Weyburn, Sask.
Freight shed to cost $25,000, for Canadian Pacific Railway. Divisional Engineer, T. Martin, Moose Jaw. General Contractor, J. H. Simmons, Winnipeg.

Public Buildings, Churches, Schools, etc.

Arthur, Ont.
The Town is contemplating the erection of a Carnegie Library to cost $8,000. Address the Town Clerk.

Aylmer, Ont.
A site has been selected and plans will be prepared shortly for the erection of a new post office. Address David Marshall.

Barrie, Ont.
Plans are being selected for new High School for Board of Education; Secretary, F. Marr. Architects, Stewart & Witton, 2 Hughson street south, Hamilton, preparing plans for new High School.

Bobcaygeon, Ont.
Tenders are called for school house, S. S. No. 2, Verulam. Two storeys and basement, brick, sand and gravel, stoves supplied by board. Oil lamps, slated roofing, hardwood floors, kalsomine trim. School must be completed by August, 1912. Plans and specifications with secretary. Board of Education. Secretary, Thos. J. Ingram, Bobcaygeon.

Brandon, Man.
Plans are called for erection of Masonic Temple to cost $35,000. Secretary, J. M. Douglas. 3-sty. and basement, 55 x 110. Plans on Temple and apartment block combined received until April 15th.

Burlington, Ont.
Tenders are called until March 31st for school for Public School Board. Ar-

chitect, Lawrence Munro, Main and Hughson streets, Hamilton.

Calgary, Alta.

The Public School Board; official in charge, H. McLelland, plans to erect a new school in the Mills Estate.

City Engineer, J. T. Child. The Commissioners recommend submitting of by-law to provide for public comfort stations to cost $30,000.

De Lisle, Sask.

The Public School Board; A. Currie sec.-treas., are planning to erect a new school 32 x 41, frame, hot air heating, stone foundation, interior finish fir, shingle roofing; cost $5,000.

Halifax, N.S.

Tenders addressed to A. Johnston, Deputy Minister of Marine & Fisheries, will be received until April 20th for the construction of a double dwelling at Manger Beach, Halifax Harbor. Plans and specifications, may be seen at Dept. of Marine & Fisheries, Ottawa, Halifax, and at post offices Lunenburg, Yarmouth, Sherbrooke and Isaac Harbor, N.S.

Hamilton, Ont.

Plans are being prepared for moving picture theatre to cost $15,000, Barton and Leeming streets, for Joseph Levy, c/o Levy Bros., jewellers, King street east. Architects, Stewart & Witton, 2 Hughson street south, Hamilton.

Tenders will be called about April 1st for Sick Children's Hospital to cost $12,000, on Euclid avenue. Interested, Miss Jeanette M. Lewis, Main and Hughson streets, Hamilton.

Melville, Sask.

A by-law will be submitted for the purpose of building and furnishing a town hall. Address town solicitor.

Montreal, Que.

Plans have been prepared for remodelling Deaconess House, at 7 and 9 Coursol street. Contractors, Byers & Anglin, Limited, 65 Victoria avenue. Tenders will be called shortly.

Architect J. L. D. Lafreniere, 13 Royal Trust Bldg., Montreal, has been chosen to prepare plans for new St. Jean Baptiste Roman Catholic Church on Rachel street. Tenders called in about two weeks.

New tenders will be called for moving picture theatre and offices on St. Catherine and Dorion streets, for Messrs. J. Rosenthal & Sons, 223 Notre Dame street west, Montreal. Architect, J. Seath Smith, 207 St. James street, Montreal. Plans are being revised.

Tenders are called until March 29th for hall, offices and stores, cost $30,000, Notre Dame street west, for Union St. Joseph De St. Henri, 1877 Notre Dame street west, Montreal. Architect, R. Charbonneau, 52 St. James street. Four storeys, 45 x 100, stone and brick, steel frame, stone foundation, gas and electric lighting, hot water heating, gravel roof, hardwood trim, terra cotta partition, modern plumbing, fireproof vaults, fire escapes (2-sty. in front).

North Battleford, Sask.

Plans are being prepared for church for St. Paul's Anglican Church. Architects, Stephenson & Evans, N. Battleford.

Ottawa, Ont.

Tenders are called for fuel testing building to cost $6,000, for Dominion Government. Architects, Public Wks. Architect, Ottawa. Received by Minister of Public Works, close April 9th. Plans and specifications may be seen at above office.

Dominion Government have filed plans expropriating Wellington street property from Bank to Perley Home and to low-water level of Ottawa River for departmental building. Competitive plans will be called when purchases are made.

Owen Sound, Ont.

Plans have been completed for Public Library. Architect, Forster & Clark, Owen Sound. Tenders will be called as soon as the plans have been approved.

Red Deer, Alta.

Tenders will be called shortly for Convent School, cost $35,000. Architect, A. D. Turnbull, Red Deer, Alta. Three storeys and basement, 40 x 59, brick, concrete foundation, steam heating, electric lighting, hardwood floors, metal shingles.

Regina, Sask.

Presbyterian Church are planning to erect a new church for St. Andrews. Address Rev. Murdock Mackinnon, who will also furnish information regarding a new mission building contemplated by the Presbyterian Church.

Saskatoon, Sask.

The First Baptist Church are planning to start work this summer on the erection of a new church, cor. 19th St. and 1st avenue.

Ste. Anne, Man.

Tenders will be received by Secretary-Treasurer L. R. Magnan until April 2 for erection of a 4-room school for Ste. Anne, S.D.

St. Catharines, Ont.

Tenders are called for church, cost $15,000, St. Paul street west, for Rev. Father Smith, Western Hill, St. Catharines. Architect, A. W. Holmes, 10 Bloor street east, Toronto. Construction, stone foundation and building, steam heating, electric lighting, pine and hardwood floors.

Sydney Mines, N.S.

New tenders are called for annex to Harbor View Hospital. Secretary, Edmund McDonald. Architect, Herbert E. Gates, Halifax. Plans, etc., at General Office of the N. S. S. & C. Co., at office of Town Engineer and at office of architect. Received until March 30th by secretary.

Toronto, Ont.

Tenders are open for Public School to cost $15,000 on South side of Adelaide street, for Board of Education, City Hall. Architect, Superintendent Bishop, City Hall. 3-storey, brick, reinforced concrete, cut stone, slate.

Tenders are open for supply room to cost $10,000, on Spadina avenue, for Bd. of Education, City Hall. Architect, C. W. Bishop, City Hall. 2-storey, brick, tar and gravel roofing, structural steel, cut stone, reinforced concrete, duplex hangers, tile partitions.

Tenders are open for workshop for repairing school desks, to cost $30,000, on N.E. cor. Richmond Park. 2-sty. and basement, brick, tar and gravel roof, structural steel, cut and art stone, tile coping, machinery, concrete floors, metal sash and lath, galvanized cornice, ornamental iron. Address Board of Education, City Hall.

Vineland, Ont.

Tenders are called for school and residence, cost $6,000, for A. Culp, Vineland, Ont. Chairman Board of Trustees, Architect, T. H. Wiley, St. Paul, street, St. Catharines, Ont. Two storeys, 28 x 48, stone foundation, frame, shingle roof, Georgia pine floors, steam heating, electric lighting. Ventilating system to be decided later. Received by architect until March 30th, 1912.

Welland, Ont.

Tenders are called for Industrial Home extension to cost $5,000. Clerk, R. Cooper. Architect, T. L. Nichols, Welland. 2-storey, brick, stone foundation, electric lighting, fire escape. Received till April 3rd by R. Cooper.

Tenders have been opened for Anglican Church to cost $15,000 on Division street. Rector, Rev. Thompson, Welland. Architect, A. E. Nicholson, St. Catharines. 1-storey, 75 x 46 ft. 5 in., stone, slate roofing, stone foundation, steam heating, gas and electric lighting, ash trimming, interior finish. No definite action will be taken for some time.

Weston, Ont.

The Etobicoke Township Council will issue bonds to $3,500 for addition to school Section No. 5, near Weston.

Weyburn, Sask.

The town council is likely at an early date to consider erection of Municipal Building to contain town offices, fire department, police station, opera hall, etc.

Winnipeg, Man.

Tenders will be called shortly for city bathing station, float, etc., on Red River near Louise Bridge. Address Chairman Board of Control.

Tenders are called for school extension, Hampton street, for Brittania School Board. Sec.-Treas., W. H. Appleton. Architect, E. D. Tuttle, 701 McArthur Block, Winnipeg. Two storeys and basement, 70 x 200, brick and stone, stone foundation, steam heating, electric lighting, asbestos and slate roofing. Received by architect; close March 30th.

Tenders will be called shortly for church for All Saints Anglican Congregation. Warden, D. A. Clark, c/o Clark Bros., 143 Portage avenue, Winnipeg. Red brick, stone facings, hardwood doors, iron clamps, interior finish, dark mahogany, indirect electric lighting, steam heating. Site is being cleared. Church to be finished by end of summer.

Wolfville, N.S.

The town proposes to erect a new fire station 100 x 28 ft. Cost $3,000. Clerk, A. E. Coldwell.

CONTRACTS AWARDED

Chatham, Ont.

J. L. Wilson & Son, architects, Board of Trade Bldg., Chatham, are preparing plans, etc., for a proposed new theatre to be erected on King street at a cost of $30,000. The building will be of semi-fireproof construction, concrete walls.

brick, stal trusses, etc., steam heating and modern plumbing.

Edmonton, Alta.
Office and school premises to cost $130,000, on 7th street. Builder, McDougall Forester. 6-storey, top flat to be used as a school, the balance, offices and apartments.

Hamilton, Ont.
New Cathedral School. Owner, Separate School Board. Architect, L. A. Wardell, Bay and Hunter streets. Contractor, W. H. Cooper, Robert and Emerald streets.

Excavation has started on Separate School to cost $38,000, Sheaffe street, east of Park street. Architect, Lindsay A. Wardell, Bay and Hunter street Chairman Bldg. Committee, Rev. Dean Mahoney, Park and Colborne streets, Hamilton. General contractor, W. H. Cooper, 197 Emerald street N.

Contract is awarded for grand stand for Hamilton Jockey Club; manager, A. R. Laudon, Grand Opera House. Hy-rib cement and plaster, J. Clapham & Son, 14 Main street, Hamilton. Plumbing & heating, Bloom & Brittain, 123 James street south, Hamilton. Brickwork and masonry, Geo. E. Mills, 614 King street east, Hamilton. Drains, sewers, etc., J. J. Armstrong, Burris street, Hamilton. Carpentry to be done by day labor.

London, Ont.
Church to cost $30,000, for Congregation of St. Michaels. Rector, Father Hanlon. Contractor, John Keys, Stratford.

Montreal, Que.
Contract is awarded for new bath and plumbing installation at Sailors Institute, Place Royale. Architect, P. J. Turner, A.R.I.B.A. Plumbing, Selkirk Bros., 109 St. Viateur street. Marble, Smith Marble & Construction Co., Ltd., 145 Van Horne avenue. Roofing and asphalt flooring, Geo. W. Reed & Co., Ltd., 37 St. Antoine street.

Outremont, Que.
Foundations are in for church to cost $30,000 on Hutchinson street, for Mc Vicar Memorial Church. Architects, McVicar & Heriot, 104 Union avenue, Montreal. Carpentry, C. E. Frost, 129 De l'Epee street, Outremont. 94 x 87, pressed brick, hot air heating, electric lighting, slate and pitch roofing.

St. Thomas, Ont.
Contracts are awarded for Collegiate. Owner, Board of Education; architect, J. I. Findlay, St. Thomas; masonry, A. E. Ponsford; slate roofing, A. E. Riddle; blackboards, C. Riddle; plumbing, Hamilton & Scott; heating, E. B. Dixon; carpentry, Peter Campbell.

Toronto, Ont.
Contract is awarded for Club Building for Ontario Club, Wellington and Jordan. Architects, Sproatt & Rolph, Yonge street. Orn. Bronze, Canada Foundry. Interior woodwork, Oshawa Interior Fittings Co. Plastering, D. Grant.

Weston, Ont.
Contract is let for Children's Building to cost $20,000, for National Sanitorium Association, Weston. Architect, Dennison & Stephenson, Star Bldg., Toronto. Masonry, Davidge & Lunn.

Winnipeg, Man.
Motion Picture Theatre, addition Port and Notre Damè streets, for John A. Scuberg, Winnipeg. Solid brick and steel, felt and gravel roofing, oak and maple floor, steam heating, electric lighting, prices on interior fitting and curtains received by owner. General contractor, Jos. Johnston, Winnipeg.

Residences

Calgary, Alta.
J. A. Knoephfli, 504 McLean Block, has taken out permit for a residence on Mt. Royal to cost $4,000. 2-storey, 33 x 40, frame, concrete foundation, steam heating, shingle roofing. Owner is builder.

A permit has been granted to erect residence to cost $4,000, for J. G. Porteous, 618 24th avenue W., Calgary. 2-storey, 24 x 32, frame, concrete foundation, hot air heating, electric lighting, shingle roofing.

A permit has been issued to erect a residence to cost $4,000 on Elbow Park, for Alliance Investment Co., 1st W. Cal. 2-storey, 22 x 34, frame, concrete foundation, electric lighting, hot air heating, shingle roofing.

A permit has been granted for residence to cost $4,000 on Mt. Royal, for J. A. Hay, 1936 11th street west. 2-storey, brick veneer, concrete foundation, heated by hot air, electric lighting and hardwood floors. Owner is builder.

M. Healy, Alberta Hotel, has been granted a permit to erect two residences to cost $4,500, 15th avenue west. Two storeys, 21 x 40, concrete foundation, hot air heating, electric lighting, shingles and ordinary floors. Owner is builder.

A permit has been granted for two residences at cost of $4,500 in Sunalta, for O. Hanson, 813 A. Centre street. 1-storey, 20 ft. 6 in. x 47 ft., frame bldg. with concrete foundation, hot air heating, electric lighting, shingles and ordinary flooring.

A. E. Sibley, 8th avenue east, will erect an apartment house to cost $15,000, 18th avenue west. Architect, Burroughs & Richards, Crown Block, Calgary. Brick veneer, 2-storey, 38 x 62, concrete foundation, steam heating, electric lighting, tar and gravel roof, with ordinary floors.

Eglinton, Ont.
Tenders are open until April 3rd for residence to cost $4,800 for E. A. Chapman, 34 Sydney St. Architect, Forsey Page, Confederation Life Building, Toronto.

Montreal, Que.
Six flats to cost $7,000, on St. Marguerite street, for Chas. Desmarais, 134 St. Marguerite street. 3-storey new building of pressed brick, concrete foundation, gravel roof.

Revised plans have been prepared for apartment house on Dorchester and St. Matthew, for W. H. Dandurand, cor. St. James and St. Lawrence Blvd. Work will commence this summer.

Alf. Toupin, 107 Reille street, will start work shortly on the erection of residence and stores to cost $4,000, Reille and Desvilliers. 3-storey, 25 x 55, brick encased, gravel roofing.

Plans are being prepared for residence on Ontario avenue, for Gordon McDougall. Architect, Robt. Findlay, Phillips Place. 3-storey, brick and stone, hot water heating, electric lighting, marble baths, tar and gravel roofing, hardwood finish. Tenders to be called shortly.

North Battleford, Sask.
Plans are being prepared for residence to cost $12,000, for Mayor Griese. Architects, Stephenson & Evans.

Ottawa, Ont.
Plans are being prepared for apartment house on Gloucester street, by Architect Arthur Weeks, 75 Sparks street.

Outremont, Que.
Tenders called for residence, 364 Del'Epee street. Architect, R. Charbouneau, 52 St. James street. Two stys., 50 x 110, construction solid stone and brick on masonry foundation, hot water heating, electric lighting. Received by owner until March 29.

Red Deer, Alta.
Plans are being prepared for bungalow to cost $5,000, for A. W. G. Allen. Architects, Holman & Gotch, Red Deer and Calgary.

Regina, Sask.
L. F. Kerr, Regina, is planning an addition to apartment block in Albert Court, cor. Albert street and 13th ave.

Ridgetown, Ont.
Plans will be prepared for a brick residence to cost $3,000, for Jas. A. Crawford.

Plans will be prepared for residence to cost $3,500 for W. J. Taylor. 2-sty., brick. Work will start as soon as possible in spring.

Sarnia, Ont.
Tenders were called until March 28th for residence, cost $8,000, on London road, for C. H. Rogers. Architect, Geo. Harvey. Two storeys, cement, stone, pressed brick, concrete and stone fndn., slate roofing, hot water heating, electric lighting, hardwood floors.

Saskatoon, Sask.
Plans are being prepared for terrace of residences to cost $5,000 for M. G. McVicar, Saskatoon. Architect, D. Webster, Saskatoon. Frame, concrete foundation, hot air heating, electric light, shingle roofing, interior finish fir.

Plans are being prepared for residence to cost $6,000 for Mr. Moirer, Hub Roofing Co. Architect, D. Webster, Saskatoon. 2-storey, 32 x 40, brick, stone foundation. steam heating, shingle roofing, oak and birch interior finish.

Toronto, Ont.
Tenders are open for three residences, cost $7,500, on Dixon ave. near Woodbine ave., for D. B. Banermann, 5 Lamport avenue. Architect, P. H. Finney, 43 Victoria street. Two and a half stys., brick.

Plans are in progress for residence to cost $4,900, Roxboro street east, for Frank Bungay, c/o Stone Ltd. Architect, Bovell & Molesworth, 449 Yonge street. 2½-storey, brick, hot water htg., electric lighting, cut stone trimmings, mantles and tiles, hardwood finish, stucco plumbing.

H. W. King, 15 Grove avenue, will erect a detached 2½-storey house at 29

Indian Trail at a cost of $5,000. Builder, Self & Son, Howard street.

Plans are drawn for 2 detached residences to cost $8,000, 16-18 St. Andrews Gardens, for R. Dale, 440 Shaw street. 2 storey, brick, shingle roof, cut stone, mantles and tiles, hardwood finish.

F. A. McCabe, 238a Jarvis street, is planning to erect a 2½-storey brick house on Keele street near Bloor, to cost $2,700.

Tenders are open for dwelling to cost $4,800, 26 Victor avenue, for Alfred Shrubb, 28 Victor avenue. Architect, Richmond & Beggs, Kent Building, Toronto. 2-storey and attic, brick, shingle roofing.

Tenders are open for alterations to apartment house to cost $3,000 on Winchester street, for Mrs. Galloway. Architect, Henry Simpson, 82 King east.

Tenders are open for 2 pair residences to cost $9,000, Hillview avenue, near Keele, for Berger & Gold, 174 Maria street, Toronto. Architect, Jacobs & Rosin. 2-storey, brick.

Plans are in progress for residence to cost $4,600, Roxborouhg street east, for W. B. Charlton, 140 Close avenue. Architect, Designing and Drafting Company, Toronto street.

Plans are in progress for residence to cost $4,000 on W.S. Condor avenue, for J. E. Peterkin, 34 Oakmount road. 2-storey, brick front and rough cast sides, tar and gravel roof.

Plans have been drawn for 2 pair dwellings on Clendenan avenue, for F. Courtemache, 78 Howard Park. Builder, Owner. 2½-storey, semi-detached, brick.

Tenders are open for residence to cost $15,000, cor. Indian road and Howard Park, for G. S. Ransome, 72 King E. 2½-storey, brick.

Plans are in progress for 3 residences to cost $15,000, St. Andrews Gardens, for Rea Lynch & Co., 40 Charles street east. 2½-storey, brick, hot water heating, electric lighting, mantles, tiles, hardwood finish, slate roofing.

Plans are in progress for pair dwellings to cost $7,000 on Balsam avenue, for Walter A. Scott, 212 Balsam avenue. Architect, Henry Chown. 2½-storey, brick and frame, stucco.

Plans are completed for 5 pair residences to cost $25,000 on Maria street, for H. Gramblatt, 17 Fisken avenue. Builder, Owner. 2-storey, brick, semi-detached, stone foundation, tar and gravel roofing.

Plans are in progress for residence to cost $4,200, 260 Conduit street, for Fisher Bros., 20 Rowland avenue. Architect, Albert S. Fisher, 373 Roncesvalles avenue. Shingle roofing, gas and electric light, Ohio cut stone, mantles and tiles, concrete floors.

Hilletson & Cusselman, 225 Maria avenue, are planning to erect a pair of solid brick residences on Keele street, near Dundas to cost $5,400.

Plans are completed for residence to cost $20,000 at 23 Baldwin street, for L. S. Yolles, 244 Simcoe street. Architect, Redmond & Beggs, Kent Bldg. 2-sty., brick.

Tenders are open in lesser trades for brick and stone detached residence to cost $2,600, 385 Delaware avenue, for Eugene Blaise, 31 Adams avenue. Builder, owner.

Plans are in progress for dwelling house to cost $3,500 on Beresford ave., for A. S. Johnson, 213 Beresford ave. Architect, G. McWilliams. Brick, concrete foundation, ornamental iron, shingle roofing.

Tenders are called for residences to cost $5,500, E.S. Pape avenue, for Robert M. Yeomans, 19 Fairview Blvd. Architect, P. H. Finney, 43 Victoria street. Semi-detached, brick and plaster.

W. C. Cook, 43 Hastings avenue, plans to erect a residence to cost $5,000 on W.S. Coady avenue. Architect, John Hole, 85 Boultbee avenue. 2-sty. and attic, solid brick.

Plans are in progress for residence to cost $3,000 on E.S. Scarboro road, for R. E. Davidson, 188 Lee avenue. Architect, Jas. Nicoll, 10 Windsor avenue. 2-storey, brick, shingle roof, electric light, cut stone sills, septic tank, mantles and tiles, hardwood finish, plate and art glass.

J. & W. Aikman, 73 Palmerston ave., plan to erect a new residence on South side of Cheltenham avenue to cost $4,000. 2-storey, brick, stone foundation.

T. Hill, 34 Park Road, is planning to erect a pair of 2-storey brick apartment houses on Hillsboro avenue, at a cost of $12,000.

Tenders are open for 5 pairs residences to cost $18,000, Shaw street near Harbord street, for G. L. Thompson, 446 Markham street. Architect, S. A. Waggett, 61 Bleecker street. Builder, owner. 2-storey, semi-detached, brick.

Plans are in progress for apartments to cost $5,000, Fir and Fernwood Park avenue, for F. C. Davies, 213 Montrose avenue, Toronto. Architect, J. Cotter, Shaw street, Toronto. Two storeys, brick, tar and gravel roofing.

Tenders are open for the erection of one pair and one detached residence to cost $6,000, on W.S. Waverly road, for E. & E. M. Knapton, 7 Waverley road. 2-storey, brick, tar and gravel roofing.

Verden, Que.

Pat O'Brien, 175 Ottawa street, Montreal, is erecting a new residence. Two storeys, 25 x 40, concrete foundation, brick veneer, gravel roofing, gas lighting, on Evelyn street, at a cost of $3,000.

Westmount, Que.

Plans are nearly ready for superstructure of residence on Westmount Blvd. for T. B. Macaulay, 4007 Dorchester street. Architects, R. Findlay, Phillips Place, Montreal. 3-storey, 43 x 63, brick. Foundation in last fall. Tenders called soon.

West Toronto, Ont.

A. Rappaport, Dundas street, is planning to erect a new residence on Weston road. 2½-storey, brick, stone foundation, shingle roof. To cost $2,000.

Winnipeg, Man.

Tenders are called for apartments on Winnipeg avenue, for A. Johnston, 414 Maryland street. Architect, Paul M. Clemens, 331 Garry street, Winnipeg. Three storeys, 46 x 76, solid brick, stone foundation, electric lighting, steam htg., tar and gravel roof, hardwood finish.

Plans have been prepared for residence to cost $9,000 for A. Walter Scovil, 964 Grosvenor street. 2½-storey, 40 x 45, brick veneer, 1st floor frame, upper floor, stone foundation, hot water heating, shingle roofing, quarter cut oak floors and finish, billiard room to be fir finish. No contract awarded yet.

CONTRACTS AWARDED

Calgary, Alta.

A permit has been issued for 3 residences to cost $7,000 on Regal Terrace, for J. W. McDonald, 1019 5th avenue W. 2-storey, frame, concrete foundation, electric lighting, shingle roofing, hot air heating. Owner is builder.

A permit has been granted for residence to cost $12,000 on Crescent Heights, for T. Clouston, Crescent Heights. Architect, Leo. Dowler, Alexander Corner. Contractors, T. Jones & Sons, 4th avenue west, Calgary. Two storeys, 42 x 42, brick veneer, concrete foundation, steam heating, electric ltg. and shingles.

Hamilton, Ont.

Contract is awarded for residences, 2 apartment houses, cost $20,000, on Charles street, for Oscar W. Sealy, 64 Hunter street. Architect, Watt & Blackwell, Lister Bldg. Mason, Jno. Tope, 218 Charlton ave. Carpentry, R. Miller, 174 King William street. Plastering, J. & F. Hill, 307 Emerald north. Painting and glazing, J. Boyd & Son, 741 Barton street. Plumbing, Bloom & Brittain, 123 James street. Eight storeys, red pressed brick, stone trimmings, hard wall plastering, modern plumbing, wiring, combination fixtures, composition roofing.

Montreal, Que.

Apartments, cost $7,000, on St. Urbain street, for M. Silverman, 767 St. Lawrence Blvd. General contractor, Geo. Baril, 365 Plessis street. Three storeys, 30 x 40, pressed brick, gravel roof, electric light, hot water heating.

Excavation is done for five flats to cost $5,000, 1515 Papineau, for A. Handfield, 883 Mount Royal avenue East, Montreal. Three storeys, 29 x 62, stone and brick, hot water heating, gas and electric lighting. Owner is builder.

Work is starting on 4 flats to cost $3,600 for George Venne, 91 Aylwin st. Contractor, Wilfred Portelance, 222 Aylwin street. 3-storey, 23 x 50, pressed brick, concrete foundation, electric ltg., gravel roofing.

Excavation is done for 9 flats to cost $12,000 on Papineau avenue, for Alfred Doutre, 853 Mount Royal avenue East, Montreal. Architect, Arthur St. Louis, 80 St. Gabriel street, Montreal. 2-sty., 53 x 72, brick veneer, concrete foundation.

Ottawa, Ont.

Samuel J. Lucy, 48 Fulton avenue, is excavating for dwelling to cost $3,000 on Glen street. Brick veneer, 24 x 30, stone foundation, electric lighting.

Apartments on Gloucester street, for E. R. McNeil, 54 Cartier street. Architect, A. L. Weeks, 229 Sparks street. General contractor, Wm. G. Adamson.

Residence to cost $2,500, Fairmont avenue. General contractor, E. A. Morton, 56 Spadina avenue, Ottawa. Brick veneer, 19 x 37, stone foundation, electric lighting.

Excavation has started for residence, cost $33,000, on Daly avenue, for F. F. Ahearn, Albert street. Architect, W. E. Noffke, Central Chambers. General contractor, Holbrook & Sutherland, Ottawa. Marble and tiling, Sanitary Tiling Company, Montreal. Carpentry, Smith Bros., Ottawa. Painting and glazing, Howe & Co., Ottawa. Plumbing and heating, J. R. McLennen, Bank street, Ottawa.

Contracts are awarded for alterations to residence on Somerset street, for D. Storey, 393 MacLaren street. Architect, W. E. Noffke, Central Chambers. General contractor, T. A. Shore, Ottawa.

Residence to cost $14,000, on Salisbury avenue, for Judge Anglin. Architect, W. E. Noffke, 26 Central Chmbrs. Mason, A. Tubble, Ottawa, Ont. Carpenter, J. H. White, Ottawa, Ont. Electrical, J. A. Ellacott, Ottawa. Solid brick.

Excavation is finished for residence, cost $8,500, for A. J. Stephens. Architect, W. H. George, Queen street; general contractor, Geo. Eanan, 320 Bronson avenue. Brick, stone foundation, hot water heating, electric light, hardwood finish.

Toronto, Ont.

Residence, Rosedale, for F. H. Russell. Madison Apartments. Architect, F. S. Baker, Traders Bank Building. Mantles and tiles, Toronto Plate Glass Importing Company. General contractor, T. W. Hall, Eglinton. Plumbing, heating and ventilating, Fred Armstrong, 277 Queen street west. Electrical, McDonald & Willson. Steel and metal, A. B. Ormsby. Two and a half sty., brick and half timber.

Dwellings, cost $9,000, Elm and Nanton avenues, for A. W. Blachford, 35 Nanton avenue. Architects, Curry & Sparling, 90 Yonge street. Builder, Smallwood Bros., 97 Clinton street. Two and a half storeys, brick, hot water heating, electric lighting, mahogany finish, gas range, refrigerators, stucco, plate and art glass, 1143 ft. of radiation, slate and shingle roofing.

J. Snow, 25 Kenneth avenue, is erecting a residence, 2½ storeys, brick, on Oakwood ave., near Hillview, to cost $5,500.

Pair residences, cost $6,000, on Wineva avenue, for Frank Baxter, 190 Lee avenue. Builder, Geo. H. Plowman. 2 storeys, brick.

Three detached residences, cost $10,000, Taylor Place, for Gordon Taylor, 24 Heath street east, Toronto. Architect, Mitchell & White, 55 Isabella st. Builder, J. Curry, 37 De Lisle avenue, Deer Park. Two and a half storeys, brick, shingle roofing, Roman stone, mantles and tiles, stucco, hardwood finish.

Contracts are let for residence, cost $20,000, Heath and Forest Hill Road, for William Caldwell, 131 Bloor street west, Toronto. Architect, F. S. Baker, Traders Bank, Toronto. Carpentry, F. B. Heal. Painting and glazing, J. McCausland & Son, 11 Nelson street, Toronto. Plumbing, Fred Armstrong, Queen street west, Toronto. Brick, stone foundation.

Dwelling, cost $5,000, w.s. Indian road, for G. D. Bly, 284 Gladstone avenue, Toronto. Architect, J. H. Galloway, 28 Toronto street. Builder, C. C. Foy, Oakmount road, Toronto. Two storeys and attic, brick, hot water heating, pine finish, stucco, plate and art glass, shingle roofing, 766 feet of radiation.

Residence, cost $6,000, Walmer Hgts. Architect, H. B. Gilbert, 47 Wellington street east, Toronto. Builders, Scott & Switzer, 38 Laughton avenue. Two and a half storeys, random rubble stone, brick mantles, hardwood finish, hot water heating, septic tank, shingle roofing.

Westmount, Que.

Residence, Belvedere, for Howard Murray, Montreal West. Architects, Ross & MacFarlane, 1 Belmont street. Contractors, Robertson Bros., Chestnut avenue, Montreal. Masonry and brick work,

Winnipeg, Man.

Contract has been awarded to J. J. Gibson, 261 Austin street, for residence, on Oakwood avenue. Two storeys, 30 x 40, brick, stone, electric lighting, hardwood finish, hot water heating.

Business Buildings and Industrial Plants

Berlin, Ont.

Tenders are called for addition to furniture factory, cost $35,000, for Canada Furniture Manufacturers, Limited, Toronto. Four storeys, 153 x 60, brick, cement foundation, steam heating, electric lighting and power. Received at Berlin until April 1st.

Bridgeburg, Ont.

John H. Atwood, furniture dealer and grocer, is planning to erect a business block. Three storeys, 35 x 90, brick, concrete foundation.

Calgary, Alta.

W. McLamm, Box 1140, will erect a new store on Bankview street to cost $2,500.

The Commissioners recommend submitting of by-law to make additions to the city stables at a cost of $12,000. City Engineer, J. T. Child.

J. McDiarmid, P. O. Box 1173, will erect a stone cutting plant, one storey, 80 x 32, frame construction, electric lighting, to cost $10,000.

Mr. Pohl, publisher of "Deutsch Canadier." is having plans prepared for the erection of an hotel on Third avenue and Fourth street east, to cost $125,000.

A permit has been issued for store and residence, cost $5,000, to D. W. Freeze, 2413 First street east. Two storeys, 25 x 40, brick veneer, concrete foundation, electric lighting, steam heating, ruberoid roofing, steam boiler.

Humbolt, Sask.

Northern Crown Bank, Winnipeg, have purchased a site here for the erection of a new building.

London, Ont.

Plans have been prepared for store for Douglas Grand c/o Llewellyn Meredith, Talbot street. Architect, Watt & Blackwell, Bank of Toronto Chambers, London. Tenders will be called by architects about the end of the month.

Maisonneuve, Que.

Ames, Holden & McCready, Limited, 201 Inspector street, Montreal, are contemplating the erection of a new shoe factory.

Montreal, Que.

Plans are being prepared for remodelling business building; new front and interior alterations. Interested, Sawyer Medicine Company, 31 Latour street, Montreal. Architects, Peden & McLaren, 20 St. Alexis street, Montreal.

Niagara Falls, Ont.

Tenders will be called shortly for store, cost $18,000, on Queen street, for Geo. Badger, Queen street. Architect, C. M. Borter, Niagara Falls South. 2 storeys, 45 x 80, brick, concrete foundation, hot water heating, electric lighting, tar and gravel roofing.

North Battleford, Sask.

Plans are being prepared for office block, cost $10,000, King street, for J. A. Foley. Architects, Stephenson & Evans North Battleford. Brick.

Plans are being prepared for an office block, cost $10,000, on King street, for Messrs. Griess & Wood. Architects, Stephenson & Evans, North Battleford.

Ottawa, Ont.

Plans are in preparation for stores, cost $13,000, on Wellington street, for D. H. McLean, Fairmount avenue, Ottawa. Architect, W. E. Noffke, Central Chambers.

A permit has been granted for shop and dwelling, cost $2,500, on Lisgar st., for J. P. Band, 365 Frank street. Alterations and addition, solid brick, 11 x 48, concrete foundation.

Plans are being prepared for commercial building on Sparks and Lyon streets, for Dr. D. H. Baird, Bank and Sparks street. Architect, Allan Keefer, Sparks street. Four storeys, 66 x 99.

Plans have been prepared for alterations to store on Rideau street for A. E. Rea Company, Limited, Rideau and Sussex streets. Extra fittings will be required. Alterations provide for main entrance on Mackenzie avenue and big display window construction.

Regina, Sask.

Regina Trading Company, Departmental Stores, President J. F. Bole, plan to erect new building this summer.

McAra Bros. & Wallace, Financial Agents, are contemplating the erection of an office building on Scarth street.

The Constructors, Limited, 12th ave., Manager Mr. Fraser, are planning to rebuild their woodworking factory on a larger scale this summer.

A site has been purchased for dry goods warehouse for W. R. Brock & Company, head office, Bay and Wellington street, Toronto. Site, 50 x 125, Work will start immediately.

The Lumber Manufacturers' Yards, Limited, Regina, General Manager W. E. Moore, plan to erect a new head office building. They will also open some fifty additional yards in the province.

The Saskatchewan Motor Company have had plans prepared by Architect Van Egmond, Regina, for the erection of a garage, four storeys, 54 feet, corner Rose street and Victoria avenue. Part of building fitted up for offices.

Rosthern, Sask.

The Union Supply Co., Limited, will rebuild the flour mill destroyed by fire in December, cost about $20,000.

St. Catharines, Ont.

The Sterling Bank have plans prepared by Architect John Lytle, 14 Leader

(Continued on page 73)

Tenders and For Sale Department

To Architects and Engineers

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

CITY OF SASKATOON

TENDER

For Sandstone Block Pavement

Sealed tenders, addressed to the City Commissioners, and endorsed "Tender for Sandstone Block Pavement," will be received up to twelve o'clock noon on **Friday, April 5th, 1912**, for the laying of approximately 23,100 square yards of Sandstone Block Pavement.

The Corporation reserves the right to reject any or all tenders.

All information may be obtained on application to George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, March 2nd, 1912. 12-13

CITY OF PORT ARTHUR

Notice

Sealed separate tenders, endorsed on envelope, "Tender for Paving," will be received by the undersigned up to 6 o'clock p.m. of **Monday, April 8th, 1912**, for paving the following streets:

Pearl street from Water to Court, curb and gutter, 1,836 lin. ft.; pavement in sq. yds., 4,360.

Bay street from Cumberland to Algoma, curb and gutter, 2,930 lin. ft.; pavement in sq. yds., 4,784; track laying, 3,250 sq. yards.

Algoma street from Bay to Queen, curb and gutter, 4,000 lin. ft.; pavement in sq. yards, 5,785; track laying, 4,340.

Totals, curb and gutter, 8,766; pavement in sq. yds., 14,929; track laying, 7,590 sq. yards.

Tenders will be received for Sheet Asphalt, Asphalt Block and Bitulithic.

Further instructions as to specifications and forms of tender may be obtained from L. M. Jones, City Engineer, Port Arthur.

A marked cheque for ten per cent. of the estimated amount of contract must accompany each tender.

The lowest or any tender not necessarily accepted.

J. McTEIGUE, City Clerk.
Corporation Offices, Port Arthur,
March 9th, 1912. 11-14

THE GOVERNMENT OF
THE PROVINCE OF BRITISH COLUMBIA.

To Canadian Architects

Competition for New University Buildings to be erected at Point Grey, near Vancouver, British Columbia

The Government of British Columbia invite Competitive Plans for the general scheme and design for the proposed new University, together with more detailed Plans for the buildings to be erected first at an estimated cost of $1,500,000.

Prizes of $10,000 will be given for the most successful Designs submitted.

Particulars of the competition and plan of site may be obtained on request from the undersigned.

The designs to be sent in by July 31st, 1912, addressed to

THE MINISTER OF EDUCATION,
Parliament Buildings,
10-15 Victoria, British Columbia.

Canadian Pacific Railway Company

Department of Natural Resources
Irrigation Branch

Tenders for Steel Highway Bridges

Sealed tenders, addressed to the undersigned, will be received up to noon of **April 15th, 1912**, for the design, manufacture and erection complete on piers to be provided by the Railway Company, of the following Steel Highway Bridges:—

Two Bridges, span 125 feet.
Four Bridges, span 100 feet.
Fourteen Bridges, span 75 feet.
Nine Bridges, span 60 feet.

Contract, specification, form of tender and general instructions may be had on application to the undersigned. A deposit of $25.00 will be required before specifications will be given out, which will be returned on receipt of a bona fide tender.

Tenders will only be received from parties who can show a reasonable acquaintance with work of the required character, and that they have the facilities and plant necessary for work of such magnitude.

A certified cheque or cash deposit to the amount of five per cent. of the tender must accompany all bids as a guarantee that the bidder will enter into a contract for the work should it be awarded to him, and which will be forfeited as liquidated damages should the bidder default.

Cheques or deposits of the unsuccessful bidders will be returned within ten days after the award of the contract.

The right is reserved to the Company to reject any or all tenders and to waive defects.

A. S. DAWSON,
Chief Engineer.
Calgary, Alta., March 1, 1912. 11-14

Special Notice to Contractors

Could supply you with any quantity of relaying rails or for reinforcing concrete at a very low price, B. Shragge Iron & Metal Company, 396 Princess street, Corner King; Telephone St. John 373, Winnipeg. 11-23

Machinery For Sale

1—70-ton Style C Bucyrus Shovel.
4—18-ton Porter Dinkies, 36-in. gauge.
1—12-ton Porter Dinkie, 36-in. gauge.
50—4 cu. yd. two-way Dump Cars.
1—80 h.p. Boiler on Skids.
1—30 h.p. Maruir Type Boiler.
1—Air Compressor and Tank.
80—G. T. 56 lb. Relaying Rails.

All in first class order for immediate shipment.

FRASER, BRACE & COMPANY,
P. O. Box 121,
12-15 Valleyfield, P. Q.

CITY OF MOOSE JAW,
SASKATCHEWAN

Tenders For Steam Plant

Sealed tenders marked "Tenders for Steam Plant," addressed to the City Commissioners, Moose Jaw, will be received up to 10 a.m. of **Wednesday, April 17th, 1912**, for contract "D" consisting of:—

Section 1. Water-tube boilers and accessories.
Section 2. Mechanical draft equipment.
Section 3. Fuel economizer.
Section 4. Coal and ash handling equipment.

Specifications and all information may be obtained on application to J. D. Peters, Electrical Superintendent, Moose Jaw.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.
Moose Jaw, Sask.,
March 12th, 1912. 12-14

Municipal Debentures For Sale

Town of Gleichen, Alberta

Tenders for the purchase of the following debentures will be received by the undersigned up to the **Fourth day of April, 1912**, at 6 o'clock p.m.

1. Five Thousand Dollars of 6 per cent. debentures, 20 years, annual installment, $435.92 in each year, issued by the Municipality of the Town of Gleichen for the purpose of completing the Water and Sewerage Works of the said Town.

2. Four Thousand Dollars of six per cent. debentures, 20 years, annual installment. $348.73 in each year. issued by the above-mentioned Municipality for the purpose of grading the streets of the said Town.

The Corporation of the Town of Gleichen do not bind themselves to accept the lowest, or any tender.

For further particulars apply to the undersigned.

W. J. BURR, Secretary-Treas.,
12-13 Town of Gleichen, Alberta.

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. Chicago, Ill.

TENDERS

Tenders will be received up to and including **Saturday, the 30th day of March, 1912,** for the construction of Reinforced Concrete Approaches to the East Branch Bridge of the River Sydenham at Wallaceburg.

Plans and specifications may be seen at the office of the Contract Record, Toronto, or at the Clerk's Office, Wallaceburg.

The lowest or any tender not necessarily accepted.

H. E. JOHNSON, Town Clerk,
12-13 Wallaceburg, Ont.

Road Machinery Wanted

Tenders addressed to the undersigned will be received up till twelve o'clock noon, on the **2nd day of April, 1912,** for the following machinery for the use of the corporation of the County of Welland, for use on county roads, as follows:

Two steam road rollers, of about ten tons weight each.

Two portable rock crushers, having a capacity of about ten tons per hour.

Two portable bins for storage of stone, having about twenty-five tons capacity.

Two revolving screens and two chain elevators.

Rollers and crushers are to be fully equipped with all minor implements and attachments.

Two large road graders.

Two sprinkling wagons.

One traction engine of 18 h.p., adapted to hauling of wagon trains.

Two pick plows.

Two wheeled scrapers.

Any firm or dealers who personally or through their agents canvass members of the County Council or officials of the county will be disqualified from having their tenders accepted.

(Signed) ROBERT COOPER,
County Clerk,
12-13 Welland, Ont.

BOARD OF EDUCATION
TORONTO

Tenders Wanted

Sealed tenders, addressed to the Secretary-Treasurer of the Board, will be received until **Friday noon, March 29, 1912,** for

A new school building on Manning avenue;
A new school building on Morley avenue;
Vacuum cleaning apparatus complete for five schools;
Manual training fittings at Brown's School.

Specifications may be seen and all information obtained at the office of the Superintendent of Buildings, City Hall. Each tender must be accompanied with an accepted bank cheque for five per cent. of the amount of tender or its equivalent in cash. Tenders must be in the hands of the secretary-treasurer at his office in the City Hall not later than 12 o'clock noon on the said day, after which no tender will be received.

The lowest or any tender will not necessarily be accepted.

W. C. WILKINSON,
Secretary-Treasurer.
W. W. HODGSON,
Chairman of Committee.
12-13 Toronto, Ont.

Stone Wanted

Tenders addressed to the undersigned and marked "Tender for Stone," will be received up till noon on the **2nd day of April, 1912,** for the following stone for building roads under the County Good Roads system:—

Crushed stone, per ton, and rubble stone per cord; f.o.b. cars and quarry, and delivered in car lots at different points of County of Welland.

(Signed) ROBERT COOPER,
County Clerk,
12-13 Welland, Ont.

Tenders For Church

Tenders will be received until **April 10, 1912,** for construction of St. Margaret's Church, Midland, according to plans and specifications which may be seen at the office of architect, J. W. Siddall, Janes Building, 75 Yonge street, Toronto or at Midland.

Tender will be required as follows:—

1. For completion of church.
2. For construction of stone work and erection of roof.
3. For construction of stone work only.

Stone is already on the ground and will not be included in tender. For further information, apply to F. P. Potvin, Midland, Secretary Building Committee. 12-13

Engineer and Superintendent Wanted

Applications addressed to the undersigned will be received up till twelve o'clock noon on the **2nd day of April, 1912,** for the positions of County Engineer and County Road Superintendent for the County of Welland. Applicants are to state their experience, qualifications, and the salary or remuneration required. The services of the engineer will be for part time only.

All applications are to be in writing, and to be endorsed "Application for Position."

Any applicant personally canvassing a member of the County Council or county official will be disqualified for appointment.

(Signed) ROBERT COOPER,
County Clerk,
12-13 Welland, Ont.

Sealed tenders addressed to the undersigned, and endorsed "Tender for Machinery for 3½ Yard Dipper Dredge," will be received at this office until 4.00 p.m., on **Tuesday, April 9, 1912,** for the construction of Machinery for a 3½ Yard Dipper Dredge.

Plans, specification and form of contract can be seen and forms of tender obtained at this Department and at the offices of J. L. Michaud, Esq., District Engineer, Merchants' Bank Building, Montreal, Que., and J. G. Sing, Esq., District Engineer, Confederation Life Building, Toronto, Ont.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.
Department of Public Works,
Ottawa, March 14, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department. 13

Sealed tenders addressed to the undersigned, and endorsed "Tender for Dredging, Toronto, Ont.," will be received at this office until 4 p.m. on **Wednesday, April 3, 1912,** for dredging required at Toronto, Ont.

Tenders will not be considered unless made on the forms supplied, and signed with the actual signature of tenderers.

Combined specification and form of tender can be obtained on application to the Secretary, Department of Public Works, Ottawa. Tenders must include the towing of the plant to and from the work. Only dredges can be employed which are registered in Canada at the time of the filing of tenders. Contractors must be ready to begin work within thirty days after the date they have been notified of the acceptance of their tender.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C. DESROCHERS, Secretary.
Department of Public Works,
Ottawa, March 22nd, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department. 13

Canadian Pacific Railway Company

Department of Natural Resources

Tenders for Concrete Construction

Sealed tenders, addressed to the undersigned and endorsed "Tenders for Concrete Structures," will be received up to noon of **May 1st, 1912.** The work to be let includes the concrete structures in about half of the area comprising the Eastern Section of the Company's Irrigation Block, Alberta. Materials, except for forms, will be furnished by the Company. Materials for forms and all labor must be furnished by the Contractor. The approximate quantities are: 15,000 cubic yards of concrete and 1,200,000 pounds of reinforcing steel. The quantities in individual structures vary from 5 cubic yards to 700 cubic yards.

Plans, specifications and full information will be furnished after April 1st, 1912, on application to the undersigned. A deposit of $100 will be required before plans, etc., will be given out, which will be refunded on their return in good condition.

All proposals must be accompanied by a certified cheque, payable to the undersigned, for five per cent. of the amount of the tender, to be forfeited as liquidated damages should the bidder neglect or refuse to enter into a contract in the event that the work is awarded to him.

Proposals must be made on the standard form provided. Alterations thereto, interlineations or qualification of prices may invalidate the bid.

The right is reserved to reject any or all bids and to waive defects.

A. S. DAWSON,
Chief Engineer.
Calgary, Alta., March 20, 1912. 13-15

Situations Wanted

Civil Engineer

Civil Engineer, experienced on railroad engineering and hydro-electric development in Western Canada, at present employed, desires engagement in responsible position with successful contractor. Reply Box 466, Contract Record, Toronto, Ont. 12-13

FOR SALE

A well established and paying cement block and tile manufacturing plant, located in an Eastern Ontario town. Good reasons for sale. A money maker for a man with a small capital. $1,500 cash handles this proposition. Full particulars from F. Gemercy, 22 College Street, Toronto.

Port Stanley Waterworks

To Contractors

Sealed tenders addressed to the undersigned will be received until noon on **Friday, the 29th** inst., for the following:

1st, Erecting steel stand pipe;
2nd, Concrete foundation for same;
3rd, Supplying cast-iron pipe and castings;
4th, Supplying valves and hydrants.

For further particulars address

12-13 JAS. A. BELL & SON.
Civil Engineers St. Thomas, Ont.

TOWN OF SUDBURY

Province of Ontario

Sewerage Works

Sealed tenders will be received by the Town Clerk until 8 p.m. on **Wednesday, April 17th, 1912**, for the following works:—

Contract "A"—Main Sewer, 8,555 feet, 20-in., 18-in. and 15-in.

Contract "B"—Sanitary Sewers and Force Main.

Contract "S" Sewer Pipes and Junctions.

Plans and specifications may be seen at the office of the Town Clerk, Sudbury, or at the office of the Engineers, Mail Building, Toronto.

No tender necessarily accepted.

J. G. HENRY, Esq., Mayor,
GEO. TUDDENHAM, Esq.,
Chairman Sewer Committee.
GEO. ELLIOTT, Esq., Town Clerk.
CHIPMAN & POWER, Engineers.
13-14

City of Moose Jaw, Sask

Tenders for Wooden Water Tank

Sealed tenders, marked "Tenders for Wooden Water Tank," addressed to the City Commissioners, Moose Jaw, Saskatchewan, will be received up to noon on **Saturday, April 6th, 1912**, for the supply delivered F.O.B. cars Moose Jaw, of the following:—

One wooden water tank, sixteen (16 ft.) feet in diameter and fourteen (14 ft.) feet high, with a suitable roof fitted with the necessary hoops and draw lugs. The tank to be made of three inch (3-in.) lumber, the kind of lumber to be stated in the bid. All parts to be accurately fitted ready for erection. Bidders shall also furnish with tender for the tank a drawing of the same, together with plans for a trestle about twelve (12 ft.) feet high ready to receive the tank, the trestle to be erected by the City of Moose Jaw. It is expected that the tank will be erected by the city force, but the parties tendering will also give a price for the tank erected.

The lowest or any tender not necessarily accepted.

Dated at Moose Jaw this 21st day of March, A.D. 1912.

A. W. MAYBERY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.
13

Business Buildings and Industrial Plants

(Continued from page 69)

Lane, Toronto, for the erection of a branch building on St. Paul street to cost $3,000.

Saskatoon, Sask.

The Hub Roofing Company are planning to erect a new brick factory.

Competitive plans are called for new hotel "Butler," R. S. Barry, proprietor.

Thompson & Homer are planning to erect a warehouse for plumbers' supplies to cost $5,000.

Western Supply Company have been granted a permit for erection of temporary warehouse costing $3,500.

The Standard Trust Company are planning to build an office building. Fireproof, brick and terra cotta front, on Third avenue.

Plans are being prepared for new building on Second avenue for Royal Bank of Canada, Montreal, Que. Architect, R. M. Thompson, Saskatoon. Work will commence this spring.

Stratford, Ont.

The Borland Sulky & Cart Company are planning to build an extension to their plant on Huron street.

Toronto, Ont.

Plans are in progress for two stores, one assembly hall, one flat, cost $4,000, on Leslie and Myrtle streets, for Geo. H. Jackson, 306 Dovercourt Road. Three storeys, brick veneer, concrete foundation.

Store and billiard room, cost $2,500, on McGee and Queen streets, for C. Shier, 189 McGee street. Architects, Mallory & Thalcher, 31 Queen street. J. Caldwell, 185 Major street, Toronto. Frame and brick.

The Gibson Electric, Limited, agents for the Hupp Yeats Motor Car Company, Detroit, have purchased the Granite rink on Church street and will remodel the front for show rooms. A. L. Spalding is treasurer, 331 Huron st., Toronto.

The Canadian Northern Railway propose the re-construction of an office building, 70-76 King street east. Land Commissioner, Lieut.-Col. A. D. Davidson, c/o Davidson & McRae. Present lease held by tenants expires May 1st, when operations will begin.

Tenders are open for stores and dwellings, cost $4,800, on Bellwoods avenue, for T. Capitosta, Bellwoods ave. Architect, J. H. Galloway, 23 Toronto street. Two storeys, brick, stone foundation, store front, galvanized cornice, tar and gravel roofing. Bids received on both hot water and hot air heating.

Tenders are open for warehouse, cost $60,000, Wellington street west, for Copp Clark Company, 64 Front street west. Architect, Wickson & Gregg, 59 Yonge street, Toronto. Four storeys, brick, concrete foundation, steam heating, fire-doors, fire-brick, structural steel, cut stone lintels, tile coping, oak hardwood finish, reinforced concrete, steel rolling doors, boiler house, metal sash and lath, plate and art glass, ornamental iron, plunger and electric elevator, garage, Ohio cut stone, 177 h.p. Multitubular boiler, 60-in. diameter and 16 feet long, with 83 3-in. tubes, oxide paint, fireproof paint, tar and gravel roofing.

Welland, Ont.

Frank Carrocci has had plans prepared by Architect T. L. Nichols, for the erection of stores, two storeys and basement, brick, stone foundation.

The Holman Electrical Sign Manufacturing Company, now of 10 Front street west, Toronto, will remove to Welland and work will start in about a month on alterations to their proposed new premises.

West Lorne, Ont.

Barnum Howse has purchased site of Hotel Elgin, lately destroyed by fire. A business building or hotel will be erected.

Weyburn, Sask.

O. S. Mitchell is planning to erect a 3-sty. store and office building, 30 x 120, and also proposes to erect one sty. to rear of present store which he will occupy while larger building is being erected, which may take three years.

Winnipeg, Man.

Plans are being prepared for addition to warehouse for Richardson & Brown, Commission Merchants. Architect, G. W. Northwood, 701 McIntyre Building. Four additional storeys, brick, steam heating, electric lighting.

Winnipeg, Man.

Plans are being prepared for alterations to Rex Hotel on Fort street. Angelo Ferrari, manager. Brick and stone, steam heating, felt and gravel roofing, electric lighting, interior finish fir. New bar fixtures, etc.; also pool room being enlarged.

CONTRACTS AWARDED

Hamilton, Ont.

Contract let for factory, cost $16,000, cor. Barton and Bellview streets, for Fritz Preserving Company, Limited. Contractor, W. H. Yeates, Jr., 18 Leaming street.

Tenders are called until March 28th for warehouse, Stuart street, for Dominion Vinegar Company. Architects, Mills & Hutton, Bank of Hamilton Bdg.

Montreal, Que.

Additions to building of F. N. Southam, 63 St. Alexander street, Montreal, Publishers. Architects, Brown & Vallance, St. James street, Montreal. Contractors, The Atlas Construction Company, Limited, 745 St. Catharine street, Montreal.

Store and dwelling, cost $5,600, on St. Dominique street, for M. Silverman, 767 St. Lawrence Blvd. Pressed brick, concrete foundotion, gravel roof, gas and electrical fixtures. Three storeys, 30 x 44, General contractor, Geo. Baril, 365 Plessis street, Montreal.

Auto show rooms, cost $13,000, 19 University street, for Dr. M. Lauterman, 196 Peel street. Architect, D. J. Crighton, Jacobs Bldg. General contractor, Furse & Gordon, 327 St. Antoine street. Two storeys, 56 x 120, brick, concrete foundation, gravel roof, hot water heating, electric light.

Automobile wareroom at 19 University street, for Dr. M. Lanterman, 196 Peel street, Montreal. Architect, D. J. Crighton, Jacobs Building. Contractors, Furse & Gordon, 327 St. Antoine street. Rebuilding will start immediately the ruins are removed. To be occupied by Pope-Hartford Motor Company of Canada.

Manufacturing building on Cathcart street for R. & W. Ker, hardware merchants, 326 St. Catherine street, Montreal. Architects, House of Browne, Ltd., 207 St. James street, Montreal. Contractor, Byers & Anglin, 65 Victoria avenue, Montreal. Two storeys and basement, reinforced concrete and brick, concrete foundation, hot water heating, electric and gas lighting, tar and gravel roofing. Work to start May 1st.

Office building, cor. Notre Dame and McGill streets, for McGill Street Office Building Company, Montreal. Architect, R. E. Bostrom, 132 Board of Trade Bldg., Montreal. Engineers, Purdy & Henderson, 132 Board of Trade Bldg., Montreal. Terra Cotta awarded to Terra Cotta Company, of New York. Elevators, electrical fixtures, vacuum cleaners and mail chutes not yet awarded. Work will commence May 1st. Steel frame to be completed August 1st and building finished February 1, 1913.

Ottawa, Ont.

Work has commenced on an auto sales room on Sparks street, for Russel Motor Car Company. Architect, J. A. Ewart, Sparks street. General contractor, J. & C. Law, Ottawa. Masonry, J. A. Copeland, Ottawa. Building 66 x 99 feet, foundation complete. Brick construction, electric lighting.

Contracts are let for office building extension on Sparks street, for R. Blackburn, Sussex street. Architect, W. E. Noffke, Central Chambers. Construction same as present building, concrete fndn., tar and gravel roof, steam heating, electric lighting. Steel contractors, Dominion Bridge Company, Montreal.

Regina, Sask.

Store and offices, cost $40,000, on 11th avenue, for Canadian Cities & Towns Properties, Limited, Liverpool, Eng. Agents, McAra Bros. & Wallace, Regina. Architect, N. R. Darrach, Regina. General contractor, Minkley & Traub, Regina, Sask. Three storeys, ordinary with steel supports, concrete foundation steam heating, electric light, ordinary interior finish, fire escapes, etc. Probable tenant, W. G. F. Seythes, who will probably need store fixtures.

Sarnia, Ont.

Plans are ready for store, cost $4,000, Christina street, for Jas. Peterson. Architect, owner. Two storeys, 21 x 50, concrete foundation, cement, stone and pressed brick, felt roof, hot air heating, electric light, hardwood and Southern pine flooring. Tenders received by Jas. Peterson, Sarnia.

Saskatoon, Sask.

Departmental store for J. F. Cairn, General contractor, Geo. H. Archibald, 803 Union Block, Winnipeg.

Contract is awarded for extension to store, cost $3,000, on 2nd ave., for C. H. Stephenson, Jeweller, Sask. Architect, D. Webster, Saskatoon. One storey and basement, 26 x 30, brick, concrete fndn., steam heating, electric lighting, tar and gravel roofing, interior finish mahogany.

Sydney, N.S.

Stores and offices, cost $11,000. on Charlotte street, for M. Lubchanski, Whitney Pier, Cape Breton. Architect, F. W. Spencer, Sydney, N.S. General contractors, Andrews Bros. & Robb, Sydney. Two storeys, 40 x 72, brick and reinforced concrete foundation, steam heating, electric lighting, "Barrett Specifications" roofing, hardwood floors, hemlock interior finish, steam heating boiler.

Business block, cost $11,000, on Charlotte street, for J. E. Burchell, J. J. Turnbull and Thos. Cossileno, Sydney, N.S. Architect, Harris & Horton, Halifax, N.S. General contractor, Sydney Paving & Construction Company, Sydney. Two storeys, 40 x 70, reinforced concrete and brick construction, concrete foundation, hot water heating, electric light, "Barrett Specifications" roofing, tile and hardwood floors, steam heating boiler and equipment.

Toronto, Ont.

Tenders are let for factory, cost $18,000, Gerrard street east, for Jno. G. Kent, 1297 Queen street west. Masonry, H. N. Dancy & Sons.

Two stores, cost $10,000, (1) St. Clair ave. and Dufferin street; (2) Queen E. and Kingston road, for Wm. Davies Company, Queen street. Builder, A. Clark & Son, 425 Avenue road.

The O'Keefe Brewery Company, of this city, have awarded the contract for Porous-Terra Cotta fireproofing of their new building, Victoria street, to Contractor Robert Bennett, Kingston road.

Tenders are called for store and residence, cost $3,000, Bronte, for Louis Joyce, Architects, Bovell & Molesworth, 449 Yonge street. Brick, tar and gravel roof, cut stone trim, pine trim, plumbing, metal cealing, plate glass.

Alteration to offices, cost $25,000, ot 15 Queen street east, for Confederation Life Association, 15 Queen street east. Architect, J. Wilson Gray, Confederation Life Bldg. Builder, Brown & Love, Price street. Three storeys, concrete floors, tile floors, skylight, cut stone, marble, sidewalk lights, fanlight, store fronts, vaults, plate and art glass, ornamental bronze, Crotch Island Granite.

Vittoria, Ont.

Plans are in preparation for canning factory, cost $8,000, for Norfolk Canning Company. Architects, Watt & Blackwell, Lister Bldg., Hamilton, Ont.

Windsor, Ont.

Stores and flats, cost $9,500, Sandwich street west, for Joseph Peters. Architects, Jacques & Company, Windsor. Masonry, George E. Sewell; carpentry, Elmer Gignac; painting and glazing, J. Faulkner; plumbing and heating, J. Purser; iron work, T. Blackburn; wiring, J. Clark; all of Windsor. Brick, 46 x 60, electric lighting, prepared roofing. Georgia pine interior finish.

Winnipeg, Man.

Office building, cost $9,000, for A. McTavish, Canada Life Bldg. General contractors, Dunn & Wallace, Winnipeg—all but electrical work. One sty., brick, concrete foundation, tar and gravel roof, electric lighting, interior finish fir.

Office Bldg., cost $10,000, Higgins avenue, for A. M. T. Campbell, Canadian Life Association Company. Architect, Jordan & Over. General contractor, Dunn & Wallace, Winnipeg. 1 storey, 50 x 60, concrete foundation, brick, felt and gravel roof, hot air heating, electric light, interior finish fir.

Office building, cor. Notre Dame, Garry and Ellice streets, for Frank Lindsay, c/o Oxford Hotel. Architect, Woodman & Carry, Free Press Bldg. General contractor, Kelley-Simpson Construction Company, Winnipeg. 7 storeys, R steel, concrete, terra cotta facing, steam heating, electric light, oak floors.

Alterations to store and apartments on Portage avenue, for Frank Steel of Steel Bros., 360 Portage avenue, Winnipeg. Architect, W. Fingland, Enderton Bldg., Winnipeg. General contractor, Dunn & Wallace, Winnipeg. One new storey, brick and steel, electric lighting, steam heating, felt and gravel roofing, oak interior finish, ventilating system, electrical work, passenger elevator.

Power Plants, Electricity and Telephones

Coaticook, Que.

Tenders are open for 250 k.v.a. generator. Official, E. O. Baldwin, Coaticook, Que., Chairman Electric Light Committee.

Dundas, Ont.

Cataract Power Company, Hamilton, will erect a new sub-station and remodel the lighting plant. General manager, W. C. Hawkins, Terminal Station Bldg.

Hamilton, Ont.

Contracts are awarded for pole line supply and meters for Hydro-electric Board; Mayor, George H. Lees, chairman, has awarded contracts as follows:

Pole line construction supplies: London Bolt & Hinge Works, bolts and steps; Northern Electric Company, cross arms and insulators; Pittsburg High Voltage Company, insulators; Canada General Electric Company, pole braces.

Poles: Construction Supply Co., approximately 150 eastern poles; Lindsay Bros. & Co., approximately 450 western poles.

Tenders are called until April 3rd for Hamilton Hydro Department. Mayor, Geo. H. Lees; Engineer, E. L. Sifton; for seven thousand cement poles for lighting system.

Meters: Canadian Westinghouse Co., ten 10 amp. 1 phase meters, 110 volts; ten 5 amp. 1 phase meters, 110 volts; Ferranti Meter Co., one 50 amp. 3 phase, 550 volts; one 75 amp. 3 phase, 220 volts; three 75 amp. 1 phase, 220-110 volts.

Plans are being prepared for transformer station, cost $10,000, on Hughson street. Mayor, Geo. H. Lees; City Clerk, S. H. Kent; City Engineer, E. L. Sifton; Architects, Watt & Blackwell, Lister Building, Hamilton.

Business Notes

Acme, Alta.

The following suffered loss in recent fire: Merchants Bank; store building, owner, P. D. McDaniels, of Carstairs; Implement agency, owned by L. Cook; general store, owned by E. L. Collison; loss about $12,000; livery stable, owned by Mawhinney Bros., along with implement agency, bowling alley, pool hall, etc., loss about $10,000; tailor shop, owned by Andrew Coulter, loss about $[illegible],500.

Bellegarde, Sask.

Fire destroyed the Roman Catholic Church here on March 12th. Loss estimated at $5,000.

Benedict Siding, B.C.

Leask & Johnson's saw mill, near Cranbrook, has been destroyed by fire. Estimated loss $5,000.

Niagara Falls, Ont.

Store and apartments owned by Mrs. S. Logan, 8 Morrison street, Charles Connor (shoe dealer), occupant of store, Total loss about $12,000.

New Companies

Canadian Investments and Securities, Limited, have been incorporated with a capital of $100,000 to carry on a general mining and lumbering business, with head office at Winnipeg, Man. The corporators are Chas. Graham, P. Smith and D. G. MacPherson, all of Winnipeg.

St. Vital Investments, Limited, have been incorporated with a capital of $250,000, to carry on business as general builders and contractors, with head office ot Winnipeg. The incorporators are R. G. Philips, L. Waller and H. M. Hannesson, all of Winnipeg, Man.

The Waite-Fullerton Company, Ltd., has been incorporated with a capital of $20,000, to deal in all kinds of building materials, the head office is at Winnipeg and the incorporators are H. S. Waite, R. Fullerton and John Mahood, all of Winnipeg.

The Bolton Realty Company, Limited, has been incorporated with a capital of $40,000, to carry on business as a general land and building company, with head office at Bolton, Ont. The provisional directors are E. A. Jaffray, A. A. McFall and F. N. Leavens, all of Bolton.

Citizens Coal and Forwarding Company, Limited, has been incorporated with a capital of $40,000, to carry on business as coal and lumber dealers, with head office at Gananoque, Ont. The provisional directors are W. J. Gibson, A. N. Robinson and M. McParland, all of Gananoque, Ont.

Lindsay-Bailey Lumber Co., Ltd., has been incorporated with a capital of $50,000, to carry on business as a lumber and timber company in all its branches. The head office is at Toronto, Ont., and the provisional directors are N. R. Lindsay, G. F. Davis and H. Hunter, all of Toronto.

Danforth Heights, Limited, has been incorporated with a capital of $40,000, to carry on business as dealers in building materials, with head office at Toronto. The provisional directors are J. P. White, H. T. Goodman, and W. A. Dillon, all of Toronto.

The Urban Securities Company, Ltd., has been incorporated with a capital of $100,000, to carry on business as a general land and building company, with head office at Toronto. The provisional directors are A. W. Briggs, H. R. Frost and H. E. Grosch, all of Toronto.

Prices Limited have been incorporated with a capital of $100,000, to manufacture and deal in bricks, tiles, pipes, artificial stone for building, paving and other purposes. The head office is at Toronto, and the provisional directors are David Henderson, W. H. McGuire and C. F. Rooney, all of Toronto.

Construction Service Company, Limited, has been incorporated with a capital of $40,000, to carry on the business of engineering and construction of buildings, roads, and other works, the head office is at Guelph, and the provisional directors are W. L. Malcolm, A. E. Rudd and D. E. Rudd, all of Guelph, Ont.

The English Bay Lumber Company, Limited, has been incorporated with a capital of $30,000, to carry on business as saw and shingle mill proprietors, pulp and paper manufacturers and general lumber and timber merchants, the head office is at Vancouver, B.C.

Capital City Building Investments, Limited, have been incorporated with a capital of $50,000, to carry on business as general builders and contractors with head office at Victoria, B.C., to take over the business now carried on by D. J. Drummond and W. Wills.

The Firlands Irrigation and Power Company, Limited, has been incorporated with a capital of $10,000, to operate and construct telephone and telegraph systems, tramways, etc., and to conserve water powers for the development of electricity, light or other powers, the head office is at Wilmer, B.C.

Canadian Builders Supply Company, Limited, has been incorporated with a capital of $100,000, to take over the builders' supply branch of T. R. Nickson & Company, to carry on business as dealers in crushed rock, cement, plaster or other supplies, with head office at Vancouver, B.C.

British Columbia Granitoid and Contracting, Limited, has been incorporated with a capital of $100,000, to carry on the contracting business of Rudolph S. Blome Company, with head office at Victoria, B.C.

The A. E. Olts Company, Limited, has been incorporated with a capital of $100,000, to carry on business as builders, dealers in timber, cement, and other supplies with head office at Vancouver, B.C.

Canadian Southern Lumber Company, Limited, has been incorporated, with a capital of $200,000, to carry on business as sawmill owners, lumber merchants and manufacturers of timber products, etc., with head office at Victoria, B.C.

Miscellaneous

Calgary, Alta.

A permit has been granted for residence, cost $4,000, for I. Avery. Architects, Holman & Gotch, Herald Building. General contractors, Bennet & Duncan, 2411 Cedar avenue. Two stys., 26 x 34, frame, concrete foundation, shingle roofing, steam heating, electric lighting.

Drummondville, Que.

Contract is awarded for power machinery required by the town. Secretary-treasurer, W. A. Maison; general contractor, Bishop Construction Company, Limited, Montreal; sub-contracts; 250 h.p. water wheel, The Hamilton Company, Peterborough, Ont. 150 kw. generator, Allis-Chalmers-Bullock Company, Limited, Rockfield, Que.

Hamilton, Ont.

Contract is awarded for residence ond stables, cost $15,000, for Col. W. H. Bruce, 133 George street. Architects, Stewart & Whitton, 2 Hughson street south. Masonry, H. C. Gummo, 15 Tuckett street; carpentering, A. Bresett, 50 East Ave. N.; plastering, Hannford Bros., 232 Robinson; hardwood floors, J. O. Jarvis, 434 Main street west; tiling and mantles, Kent Garvin & Co., King street east; heating and plumbing, Adam Clark & Co., Maine street west.

Montreal, Que.

Plans are being prepared for remodelling Standard Life Bldg., cost $50,000, 127 St. James street. Architects, MacVicar & Heriot, 104 Union ave. Required, new passenger elevator, staircases, marble finish for hallways and minor fittings.

Tenders are called for supplies of timber, sand, Portland cement, broken and unbroken stone, castings. Copies of specifications may be obtained upon application to Mr. F. W. Cowie, chief engineer. Received until April 2nd by Secretary. Harbour Commissioners of Montreal. David Seath, secretary.

Plans are prepared for residence, cost $8,500, Jubinville ave., for Mrs. D. Gagnore, 162 Berri street. General contractors, Guertin & Bouchard, 410 Parthenais. Three storeys, 40 x 50, solid brick, concrete foundation, gravel roof, gas.

Excavation is complete for residence, cost $4,000, on St. Claire, for L. Charpentier, 3012 St. Lawrence. One sty., 30 x 32, preseed brick, concrete foundation, hot water heating, gas and electric light, gravel roof.

Plans are ready for moving picture theatre, cost $15,000, 285 Catherine st., for J. E. & J. A. Labrecque, Trust & Loan Bldg. Architect, J. A. Godin, 269 St. Denis street. Two storeys, 40 x 90, artificial stone, concrete foundation, hot water heating, electric light, gravel rfg.

Contract is awarded for residence, cost $20,000, for J. N. Lang, 110 Mark street, Montreal. Architect, K. G. Rea, Beaver Hall Hill; general contract awarded to W. M. Irving, 6 Guy Block, St. Catherine street west, Montreal.

Plans are in preparation for office building on Bleury street, for Belgo Canadian Real Estate Company, 121 Bd. of Trade. Chairman, H. W. Beauclerk. Architect, Finley & Spence, Beaver Hall Hill.

Port Arthur, Ont.

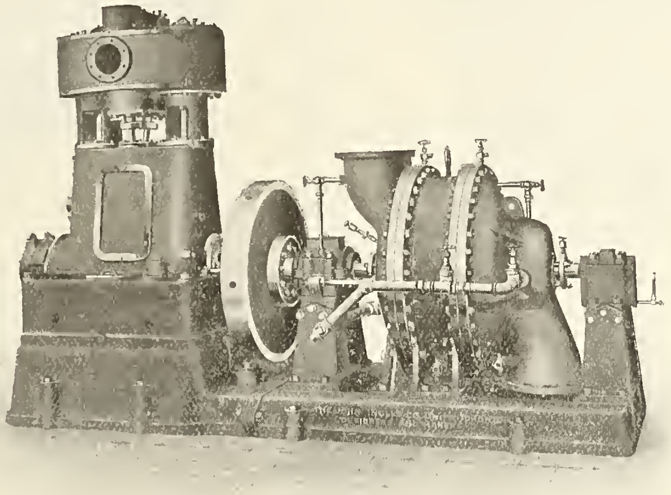
Canadian Northern Railway, A. J. McLean, manager, are contemplating hotel extensions here. Four-sty. steel and concrete construction, steam heating, electric light, tar and gravel roofing, interior finish oak, telephone in rooms.

Winnipeg, Man.

Contract is awarded for addition to Sterling Bank, Portage and Donald sts. Architect, Jas. Chisholm & Sons, Enderton Bldg., Winnipeg. General Contractor, Carter, Hall, Aldinger Company, Union Bank. Nine storeys, 40 x 45, brick, steel, concrete foundation, steam extension from main building, felt and gravel roofing, oak and maple floors, electric light.

Steam Driven Turbine Pump

which we made and installed for the City of Edmonton, Alta.



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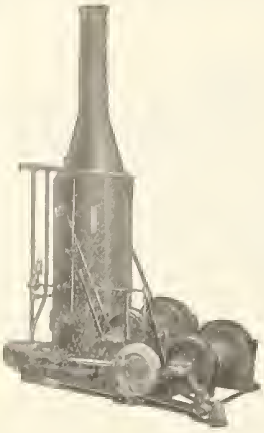

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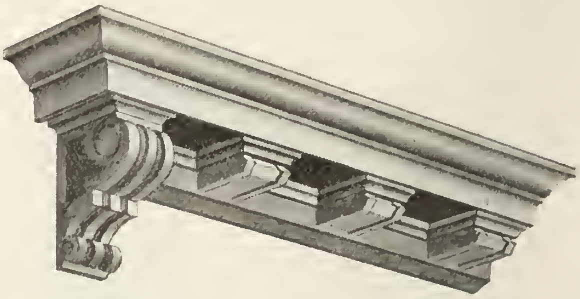

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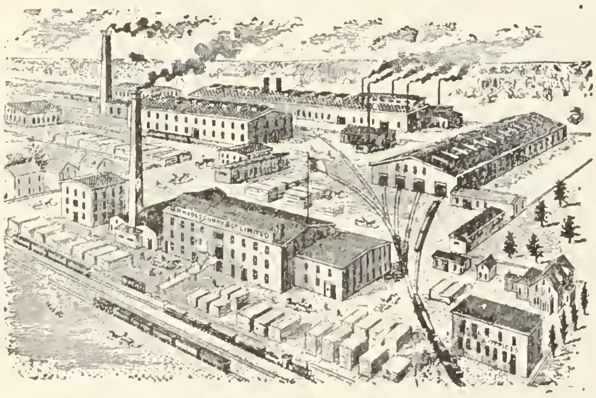

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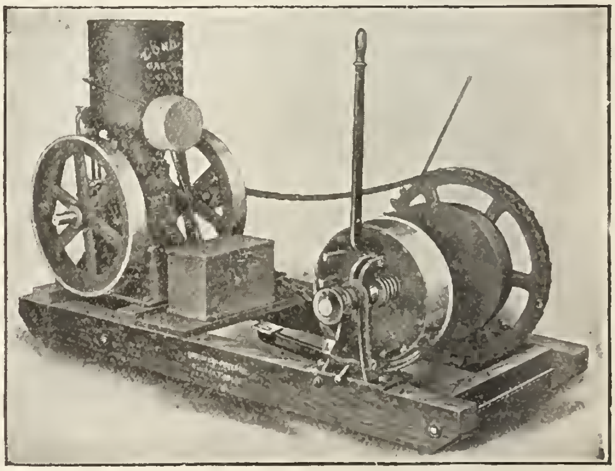

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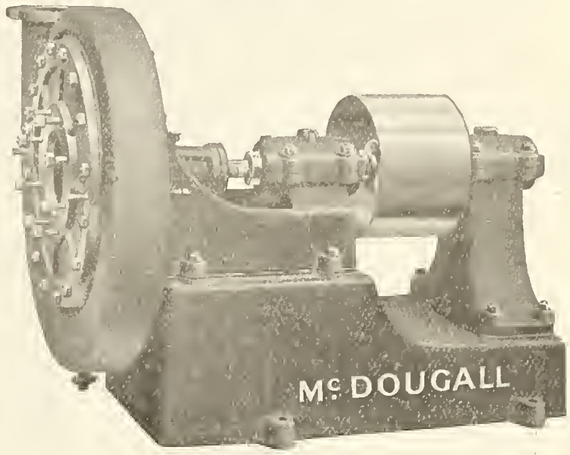

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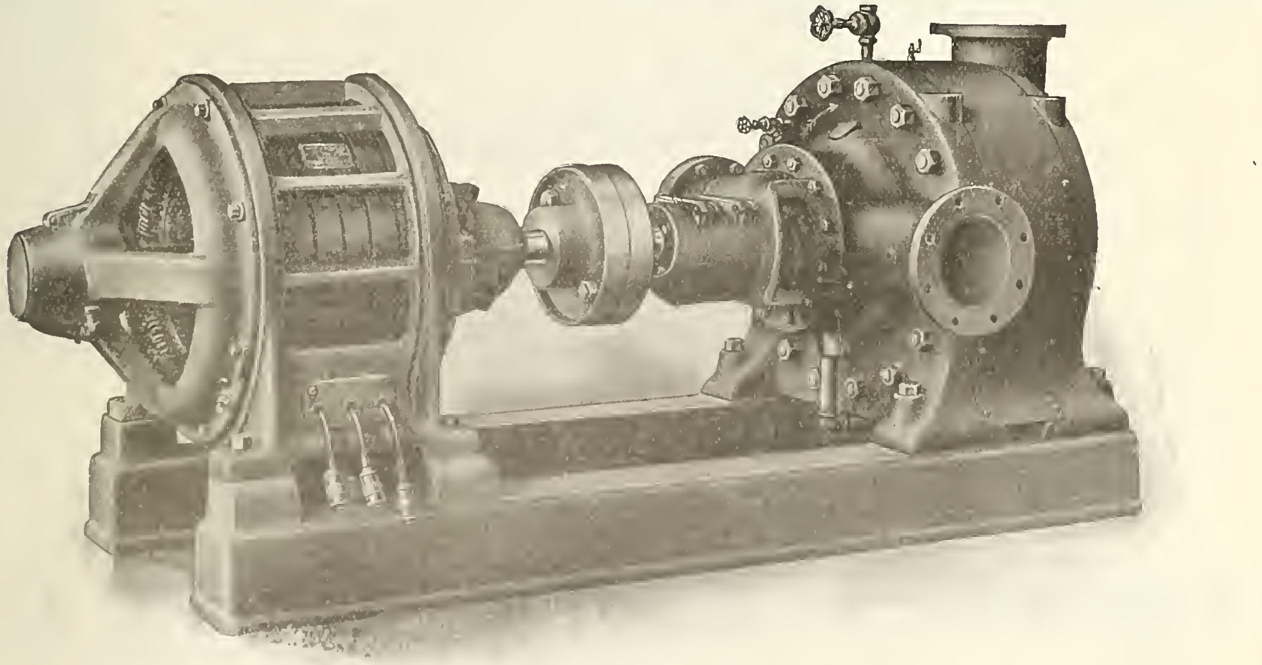

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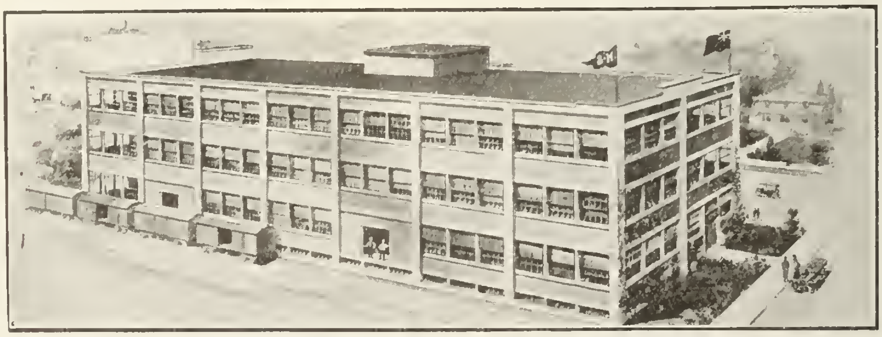

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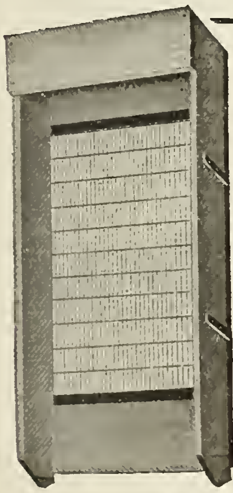

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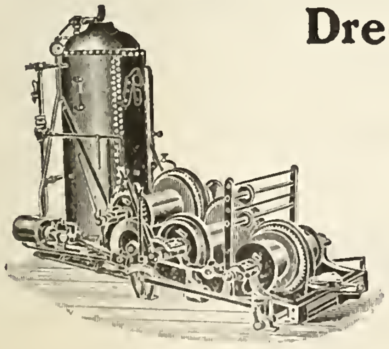

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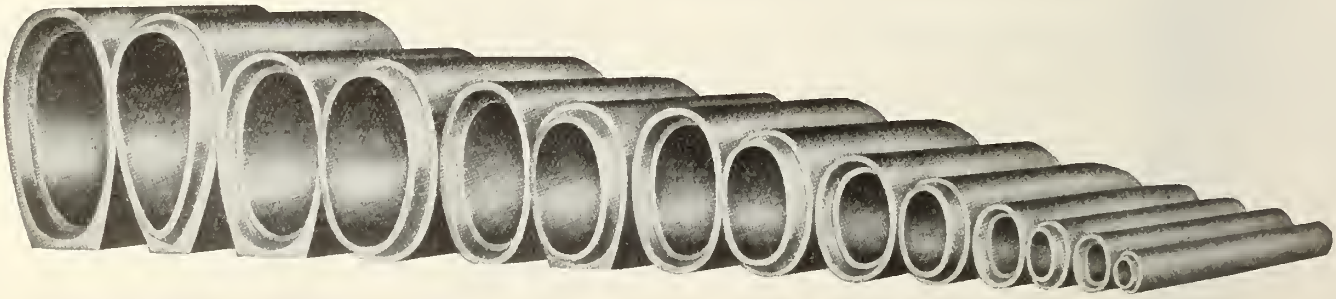

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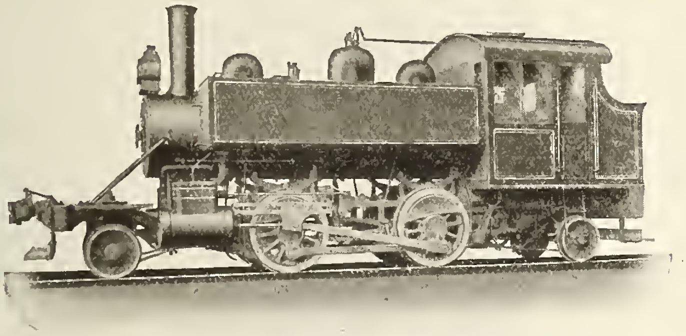

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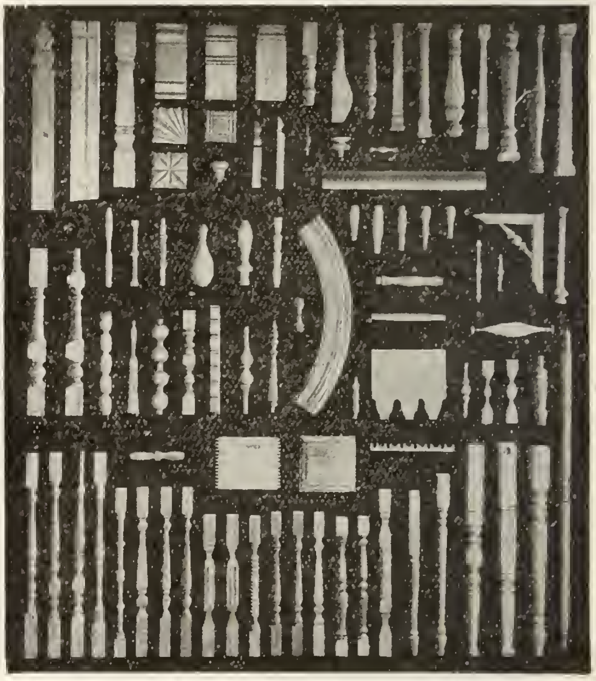

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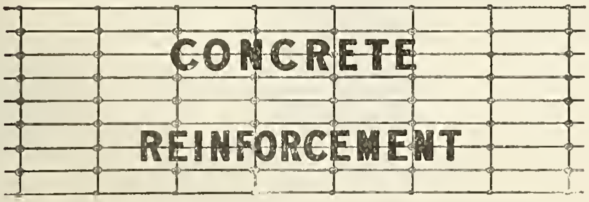

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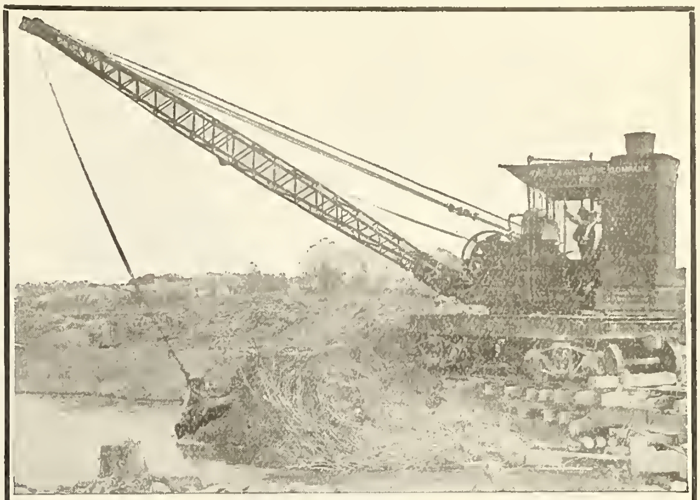

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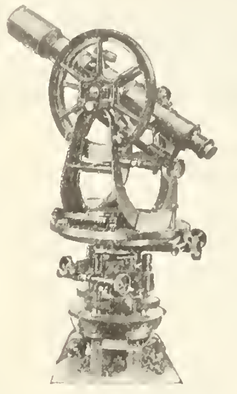

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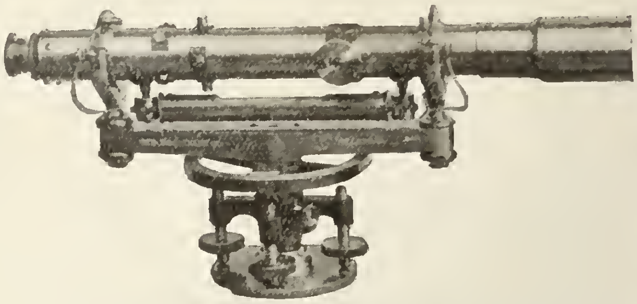

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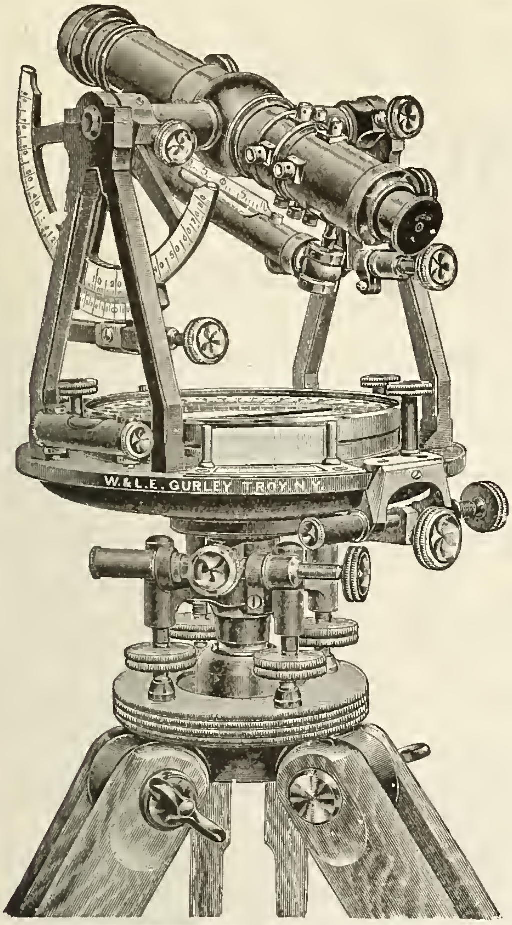
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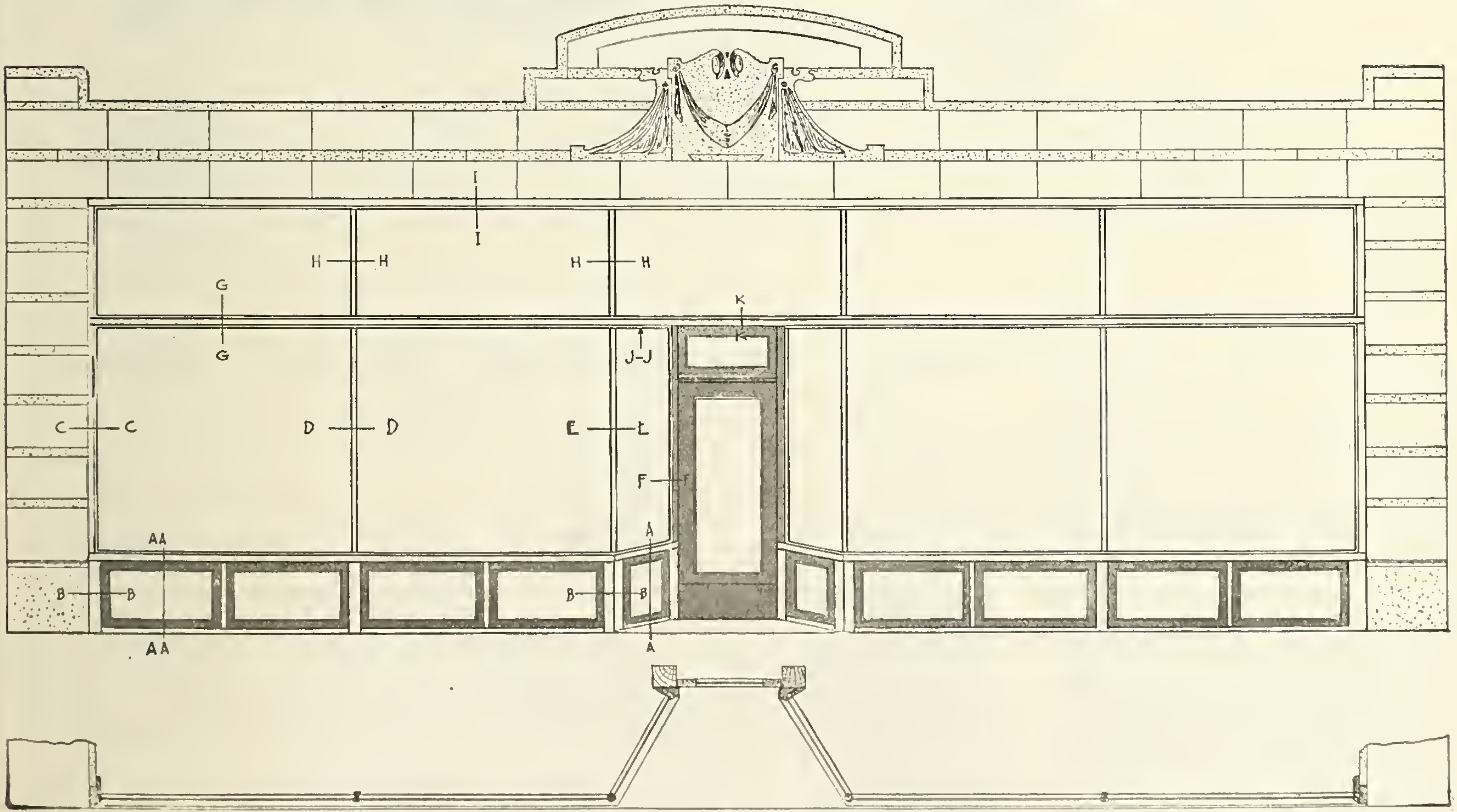

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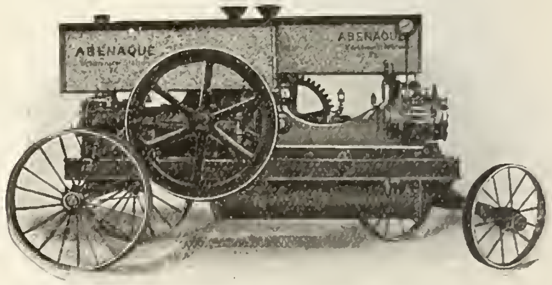

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Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

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	Star.	D.D.
10 to 25 united inches........	$4.25	$ 6.25
26 to 40 “	4.65	6.75
41 to 50 “	5.10	7.50
51 to 60 “	5.35	8.50
61 to 70 “	5.75	9.75
71 to 80 “	6.25	11.00
81 to 85 “	7.00	12.50
86 to 90 “	...	15.00
91 to 95 ‘	...	17.50
96 to 100 “	...	20.50
101 to 105 “	...	24.00
106 to 110 “	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$2.65	$4.05
40	2.85	4.50
50	3.25	4.81
60	3.45	5.50
.70	3.75	6.32
80	4.25	6.87
85	4.70	7.70
90		9.07
96		9.90
100		11.00

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
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No. 4½ Fuller's .... net $2.35

Square head brass cocks, 65; iron, 65 per cent.

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16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

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Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)	Black.		Galvanized
¼ inch	1.80	¼ inch	2.57
⅜ “	1.80	⅜ “	2.57
½ “	2.35	½ “	3.23
¾ “	2.75	¾ “	3.83
1 “	3.93	1 “	5.48
1¼ “	5.35	1¼ “	7.49
1½ “	6.44	1½ “	8.98
2 “	8.05	2 “	11.46
2½ “	12.85	2½ “	18.30
3 “	16.86	3 “	24.03
3½ “	22.57	3½ “	33.65
4 “	25.65	4 “	35.90

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

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7 and 8-nch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

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Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

Crushed stone, 2-inch, $1.30; 1-inch, $1.30; ⅜-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

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The Montreal Wreckage and Construction Company, Limited, has been incorporated with a capital stock of $100,000 to carry on business with head office at Montreal. The incorporators are Dr. Monette, E. Boisclair and J. A. Major, all of Montreal.

Weyburn Realty Company, Limited, has been incorporated with a capital of $250,000, to carry on business as general builders and contractors, with head office at Toronto. The incorporators are C. W. Morley, J. M. Forgie and J. B. Moon, all of Toronto, Ont.

La Compagnie de Construction du Canada Central, Limittee, have been incorporated with a capital stock of $300.000, to erect docks, elevators, bridges and other buildings, with head office at Montreal. The incorporators are J. W. LePailleur, Raoul Carriguan, of Lachine, and F. Dufresne, of St. Laurent.

Western Supply and Manufacturing Company has been incorporated with a capital of $20,000, to carry on business as builders and contractors, with head office at Winnipeg. The incorporators are H. C. Baldry, W. J. Wright and C. E. Reynolds, all of Winnipeg.

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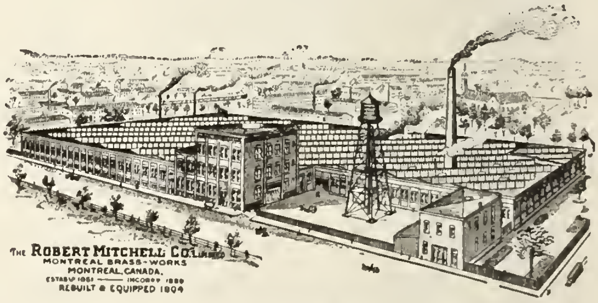
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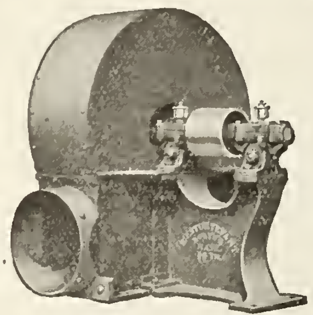

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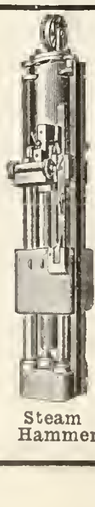

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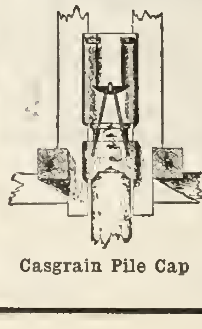

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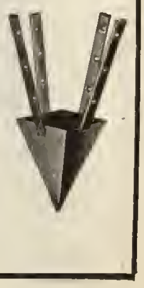

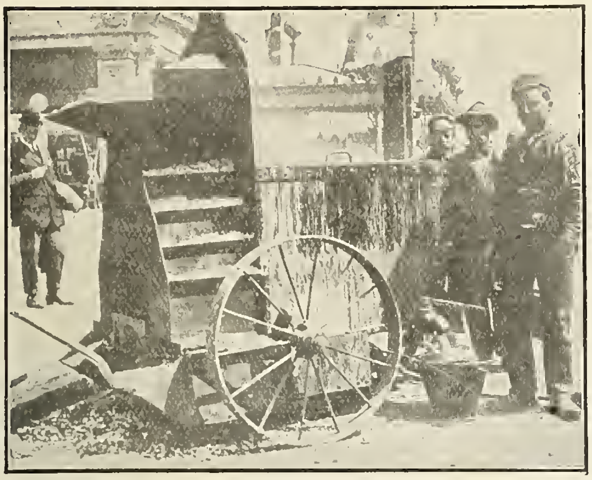

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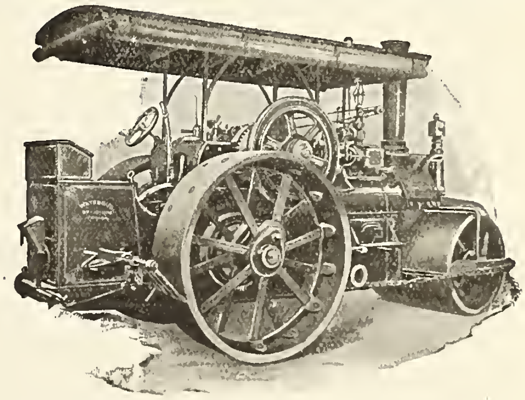

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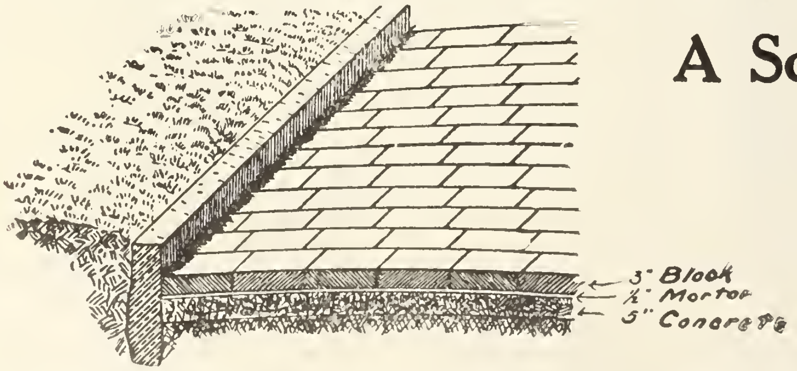

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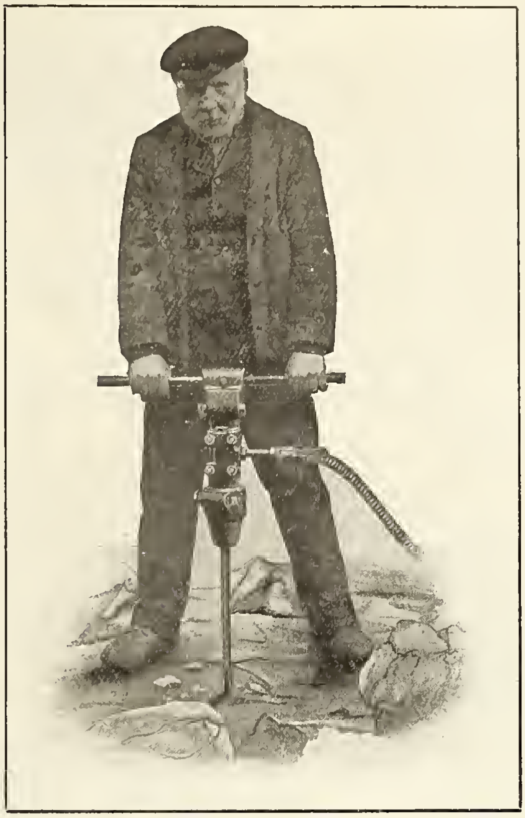

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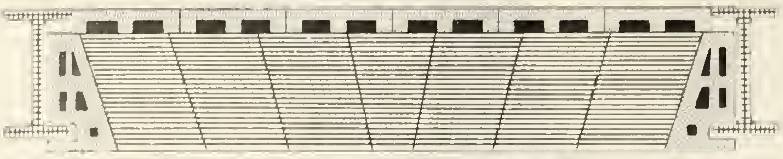

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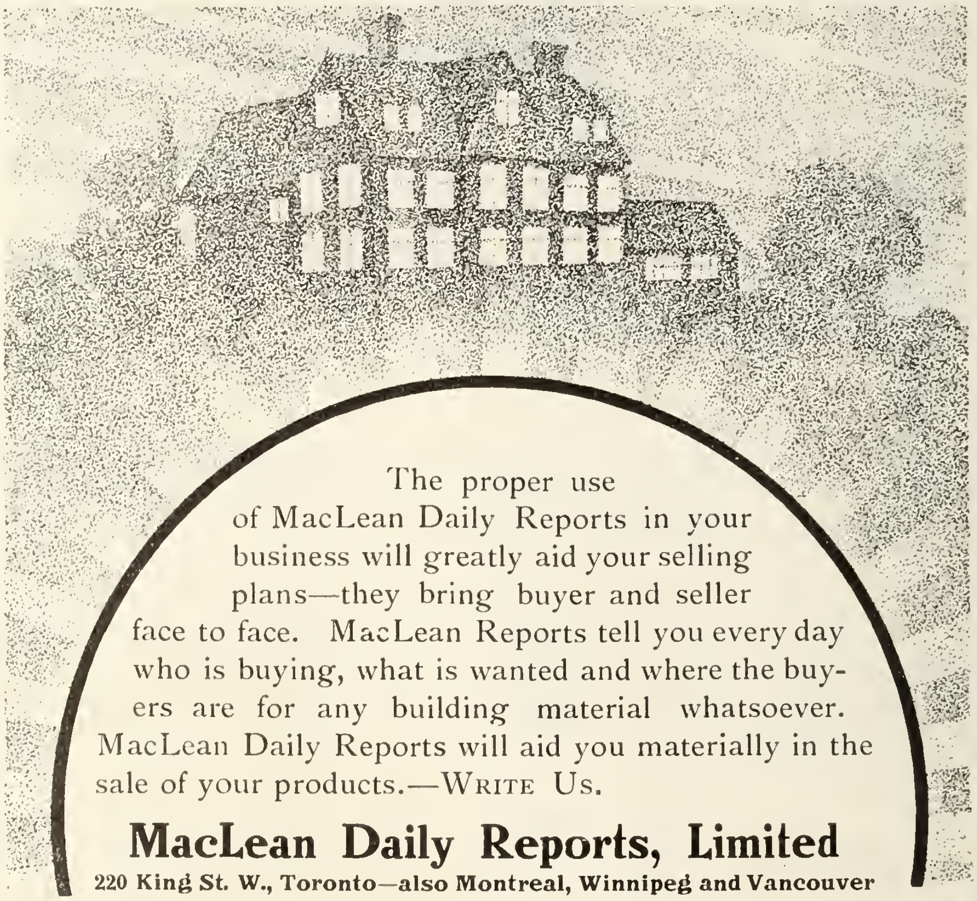

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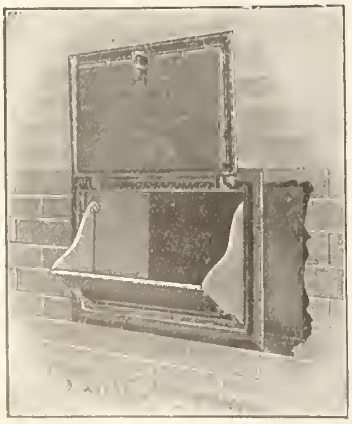

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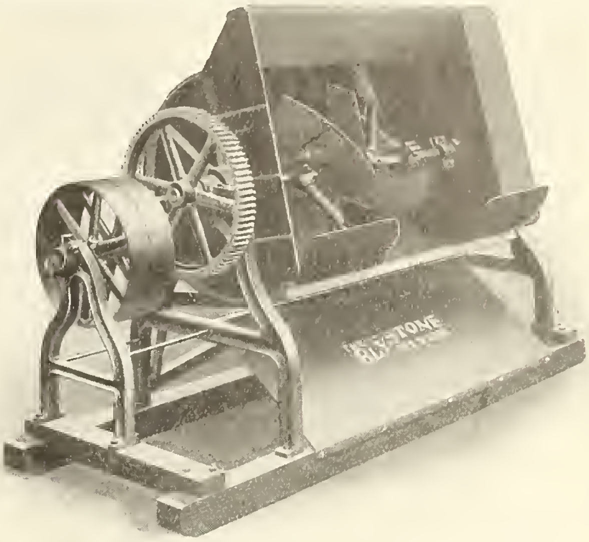

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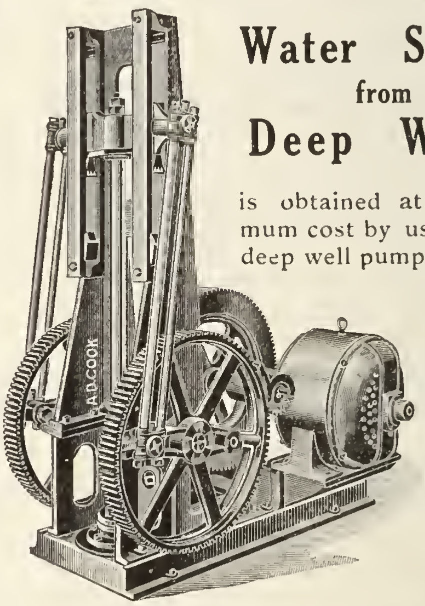

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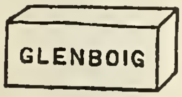

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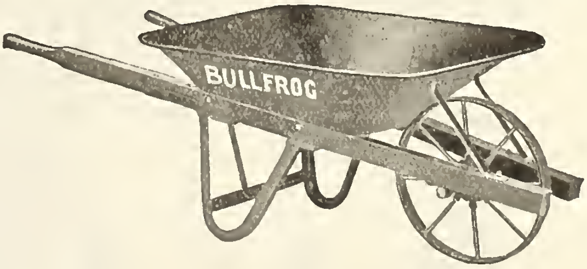

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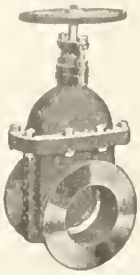

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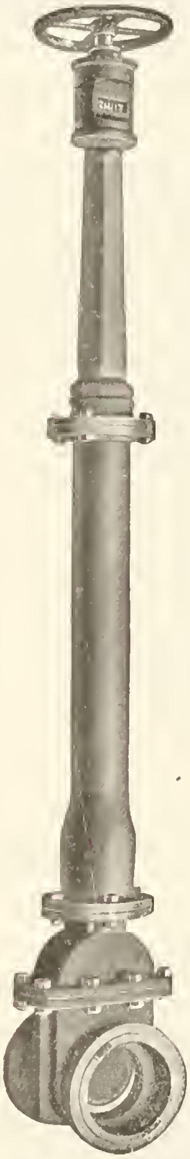

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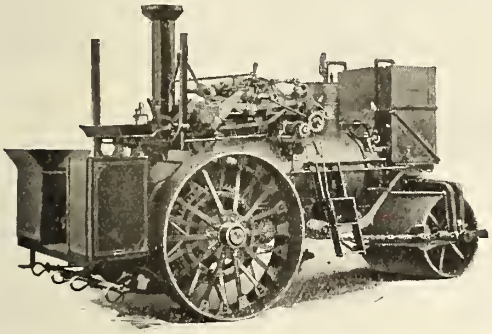

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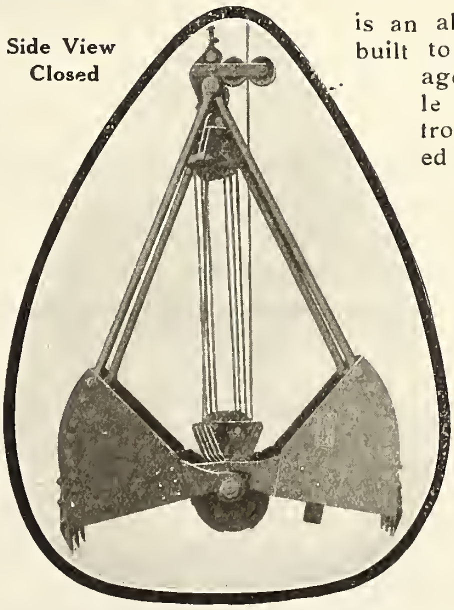

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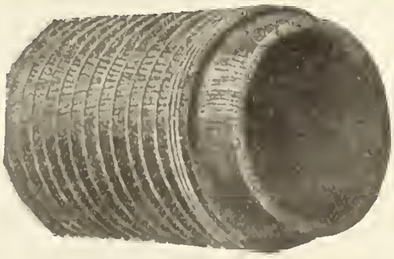

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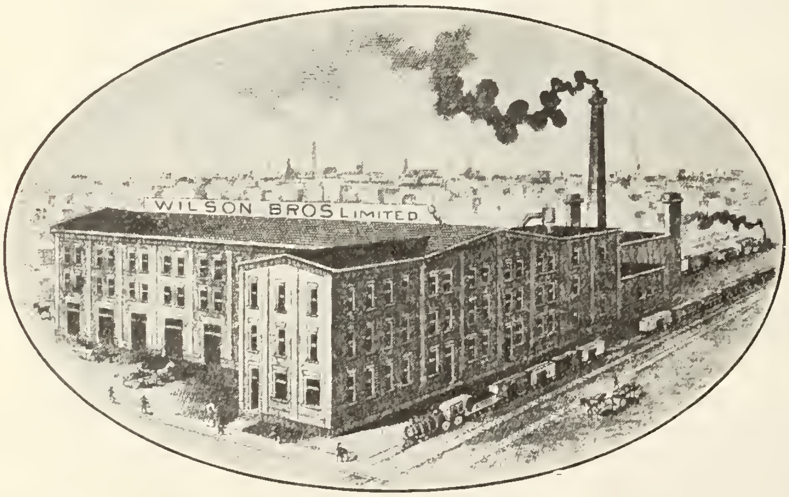

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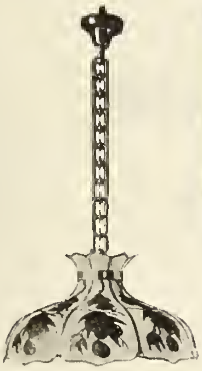

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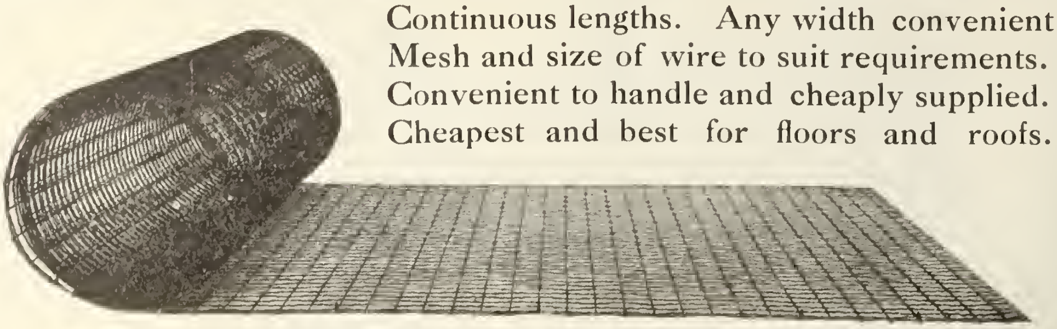

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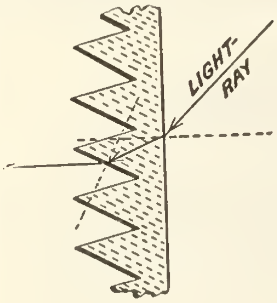

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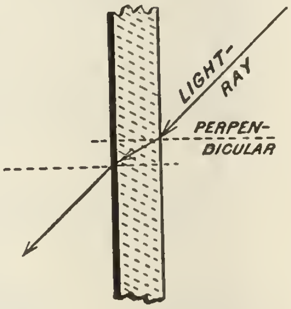

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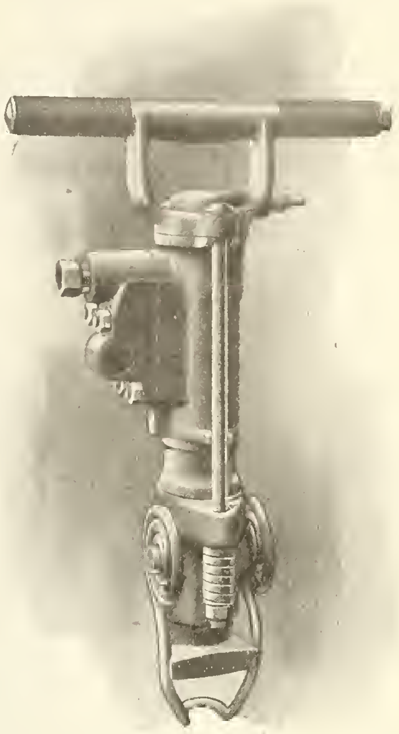

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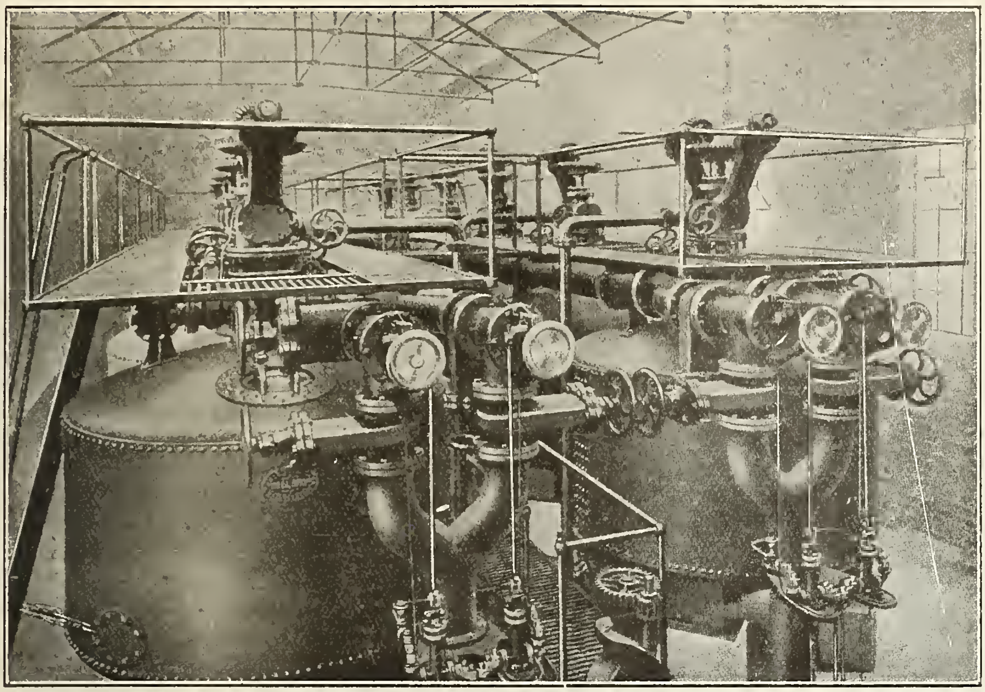

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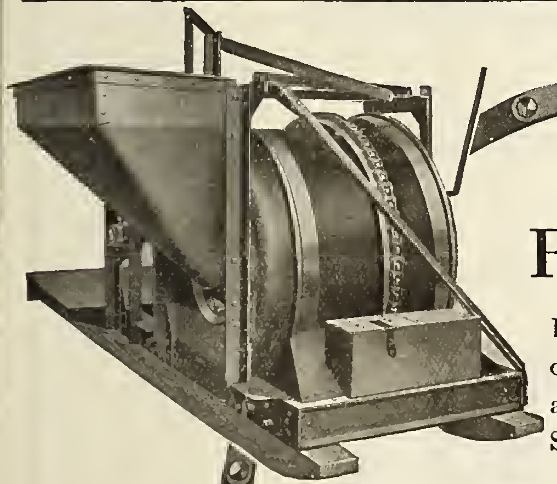

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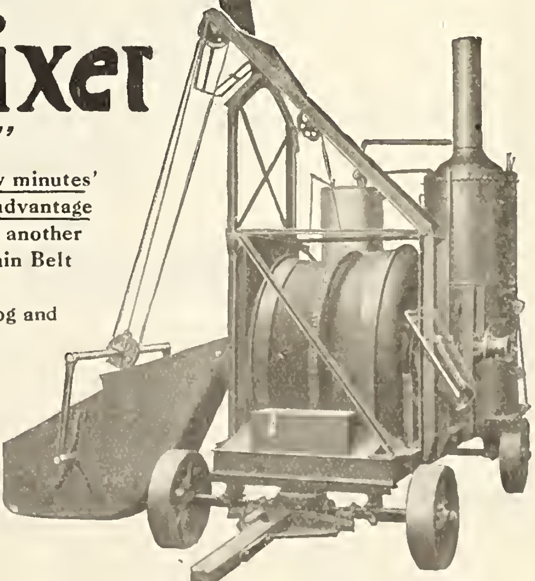

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